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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER

ELECTRO-PLATERS REVIEW

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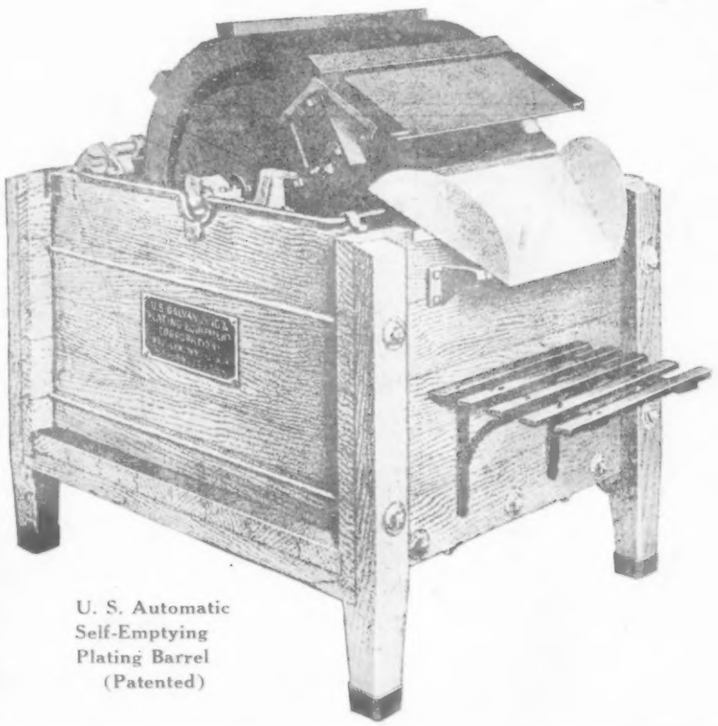

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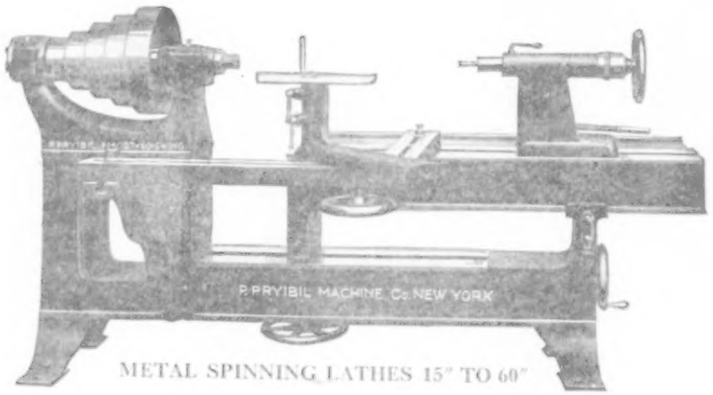

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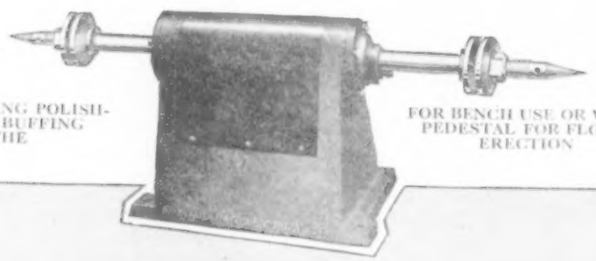

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THE METAL INDUSTRY
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THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW.

Vol. 20 NEW YORK, NOVEMBER, 1922 No. 11

A Little Knowledge Is a Dangerous Thing

A Criticism of Standard Foundry Costs as Advocated by Thomas Harper*

Written for The Metal Industry by W. L. CHURCHILL, Industrial Engineer

Mr. Harper's address on Standard Foundry Costs delivered before the Metropolitan Brass Founders' Association and published in THE METAL INDUSTRY for October contains so many faulty assumptions and such dangerous principles that I feel attention should be called to them before they effect serious harm.

In this I wish to commend Mr. Harper for his definite and outspoken convictions. If other manufacturers would be as generous in their contributions of ideas and practical experiences to their competitors, the foundry business would quickly become a much more profitable and less hazardous enterprise than is now the case.

Mr. Harper is 100 per cent right in his insistence upon foundrymen knowing what it costs them to make their products and to do business. Where he errs is in the specific methods he advocates for determining selling prices and to a lesser degree in determining his costs.

This is not surprising under the circumstances as the foundry industries have not had as intelligent handling of their costing problems as have many other industries, and many faulty principles have been advocated by accountants and others on the solution of these problems. Coming from men of authority but lacking in specific knowledge of foundry practices, much has been accepted by foundrymen, who have been too busy solving their technical and managerial difficulties to give time and thought to the correctness or incorrectness of the theories advanced by well meaning but inexperienced specialists.

Few foundrymen have the time to master thoroughly the complexities of their cost problems. Not that these are so exceptionally difficult but running a foundry and especially a jobbing foundry successfully comes as near to being a man's job as anything in the manufacturing line. It leaves little time for mastering the intricacies of accounting. It is like expecting a sea captain to be as competent an engineer as the man employed to run his engine. The captain should and does know when he has a competent engineer, but except in emergency does not attempt to run the engine unless the boat is so small that the engine man and skipper are one and the same person.

Costs are to the foundry shop the engine that keeps it going through the storms of competition and drives it ahead according to the power and the care and intelligence with which it is applied. Faulty or carelessly managed costs will bring disaster to the foundry just as certainly as the faulty or carelessly managed engine will fail to bring any other ship through dangerous storms or against tides and opposing currents.

Now to the specific faults of Mr. Harper's cost engine. First, let us take up the factor of melting cost. In the table showing the different weights of castings, he has placed a melting cost of 8 cents per pound against each size of product castings. **The fallacy of this lies in the fact that melting costs do not parallel the weight of the completed castings but of the metal melted.** It is well known that the lighter the casting, the greater the proportion of sprues, risers, gates, spillage, spoilage and pot bottoms. It is not uncommon to find castings so light and small that it requires 400 pounds of metal to be melted for each 100 pounds of shippable castings produced. On the other hand, there are large chunky castings that need no more than 120 pounds of metal melted to produce 100 pounds of completed castings. Obviously, to apply an average melting cost on these 2 extremes would be penalizing the heavier castings with the melting cost of the lighter ones. An average cost of 8 cents per pound for melting might mean 2.5 cents per pound of the heavier product and 12 cents for the lighter products.

The slight addition to the costs of the light products per pound would not seriously affect their selling price as the tonnage of such castings is insignificant but the reduction of a few cents per pound on heavy castings can easily make an appreciable addition to any foundry business.

The really serious and even vital defect in Mr. Harper's principles, however, lies in his method of profiting that automatically advocates profiteering on products that least justify it and at the same time restricting the volume of business at both extremes of casting weights.

I am not acquainted with Mr. Harper but would be quite willing to bet a good hat that if he adheres to his printed pricing rule he does comparatively little of the heavy casting business and probably thinks the competitors who get this business cut-throats or similar unkind and unwarranted titles. I'll further hazard a bet that such heavy business as he may get is obtained because the customers do no shopping around for better prices.

Likewise he probably gets very little of the lightest

* Mr. Harper's paper was published in our October issue. Mr. Churchill's reply as printed above was read at the October meeting of the Metropolitan Brass Founders' Association.

class of castings, but this is to his advantage rather than otherwise, as despite his high per pound cost it is not quite high enough in comparison with his average-weight products.

Incidentally, why will foundrymen persist in selling their services by the pound? There is no more sense or logic in the practice than the sale of shoes or machinery by the pound, even though it does make an easy means of comparison of costs and selling prices. This, however, is no criticism of Mr. Harper but of the foundry trade in general and is aside from the subject of this article.

Referring to Mr. Harper's table, he shows a 10 per cent addition for profit on metal regardless of the size of castings made. He shows a total profit per molder per day of $3.33 on the lightest castings and of over $26.00 per molder per day for the heavy castings.

Just see what these two extremes mean. For purpose of illustration, I will assume two foundries employing only 25 molders and each having a total investment of $25,000 in equipment. Foundry No. 1 runs entirely on the lightest castings and makes a profit of $3.33 per molder for 300 days per year or a total annual profit of $24,975. Pretty good! But wait until you see the profit sheet of foundry No. 2, that runs exclusively on 50-lb. castings and makes $26.36 per day per molder for 300 days. This makes $197,700 per year if he can stand it and can prevent his 25 molders from becoming rabid anarchists and insisting upon an equal division of the spoils.

To justify these charges, Mr. Harper quotes the greater investment in metal. There are a number of metal dealers who would gladly pay Mr. Harper a handsome pension for showing them how to sell any appreciable quantity of the metals used in brass foundries at a 10 per cent profit. It just isn't done, and there is no sense or reason for a foundryman putting 10 per cent profit on metal that anyone can buy without paying such a profit.

A sharp buyer would simply supply Mr. Harper with his own metal and thereby save himself enormous sums and incidentally restrict his foundryman's profits below reasonable dimensions.

Let's look into this 10 per cent charge for buying the metal for a customer. Just what does it mean? In the first place, there is no need of foundrymen investing capital in metal from the time of purchase until he has been paid for his castings for more than 45 days as an average proposition. For the sake of the argument, however, we will grant he may have his money tied up for 60 days. Banks generally charge 6 per cent per year for the use of money or a total of 1 per cent for 60 days. Even if one felt justified in charging as high as 8 per cent or 10 per cent, if you like, the 60-day use would only amount to 1 2/3 per cent. It means that on a basis of a 60-day turnover that the customer is being charged 60 per cent per year for the capital invested in metal. Even our most usurious loan sharks fail to reach such a return and the most successful boot-leggers do but little better with infinitely more risk.

Of course, such prices simply cannot be obtained as a stable and steady diet, and no agreement direct or implied among foundrymen could succeed in effecting such a rate of return as a standard, for the larger buyers would promptly start foundries of their own to meet their own needs.

Profits should not be placed on the materials purchased but upon the service rendered to customers.

Imagine the jeweler who buys platinum puts $5.00 worth of work and service into $500.00 worth of metal, delivers the platinum rings for $556.00, making $51.00 profit for less than a single day's work. On the other hand, where will the malleable iron foundry get off with only a few cents a pound in his metal costs upon which to add his 10 per cent. With the same amount of labor, skill and effort he'd make less than 51 cents.

Lack of cost knowledge is an extremely dangerous thing, but faulty application of such knowledge can be equally disastrous. It's a double edged sword. It drives away profitable business and encourages the difficult and less profitable.

The one thing that foundrymen have to sell is "service." They are not selling metal and they cannot measure their service by the pound. They are selling their knowledge, skill and ability to take raw metal and shape it into the forms desired by their customers.

What they sell is the same thing that the physicians, the lawyers and the engineer sells, and the quicker they recognize this fact and measure the value of this service in accordance with its worth, the quicker will the foundry business become one of general profit. If Mr. Harper's address does nothing more than arouse interest among foundrymen in this one fact that they are selling service and not metal, he will have performed a monumental service for this industry.

Mr. Harper's schedule shows that he is rating the service value of his organization and plant entirely too low. He aims to make only 10 per cent profit on his operating costs. Yet he is rendering a service that has taken years of training, education and practice to acquire the ability to perform. He has to contend with the hazards incident to the selection and employment of workers, finance their wages for 30 to 60 days and yet charges only a 10 per cent profit upon his cost as his recompense in selling the skill and ability of his organized forces.

For the services of converting metal into a desired shape; that is, for knowing how to obtain the proper alloy, how to melt it, how to make the necessary cores and molds, furnish the use of his equipment, building, and men, as well as his own supervision, and having his money to pay his employees, his rent, fuel, taxes, etc., until his customer can find it convenient to repay his actual outlay, he charges a modest 10 per cent profit, or as low as $3.33 per molder.

For the lesser service of acting as agent for the customer and simply buying his metal with his own money, for which he may wait 60 days, he charges that customer as much as $26.36.

Obviously, Mr. Harper and all other foundrymen who are operating on this basis are underrating the value of their professional service and overrating their value as temporary bankers for their customer.

What is the answer? It is as simple as anything can possibly be—and that is to rate profits on the service only.

How can this be done? There are several ways, but to illustrate a few will suffice to indicate the general principle.

Suppose a 25-man foundry arbitrarily decides that its accumulated experience, skill and ability is worth $25,000.00 net profit per year. It simply means that the profit rate per each man-hour of the 25 men on a basis of 300 8-hour days would be about 42 cents. Assuming that government and state's taxes on income, and discounts taken by customers, will amount to $5,000, another 8 cents per hour would have to be added, making a total of 53 cents per man-hour for profit. This would mean that after costs were computed, including the cost of the metals, an addition of 53 cents per man-hour would net $25,000 per year; provided, that 25 men's time was sold for 300 eight-hour days. If the entire force consists of but 25 men and the average man's time per year should be but two-thirds of the full normal time then the re-

quired profit ratio would need to be approximately 80 cents per man-hour.

Some manufacturers prefer to rate their anticipated or budgeted total profits to a budgeted total conversion cost (conversion cost is all costs except the materials).

In the foregoing illustration, to make a net of $25,000 per year the total yearly expenses for pay-rolls and all charges except actual material purchases might amount to $50,000, the profit ratio to total conversion cost would be 50 per cent.

There are many modifications and elaborations of this principle, but it aims to make the customer pay only for service rendered and not a profit on material purchased for his account as agent.

This plan automatically encourages business in the more expensive metal mixtures and for castings having large metal content, many of which are forced into iron on account of brass foundry practice of pyramiding profits on the purchased metals.

Of course, the costs must be accurately determined and there are many inconsistencies in the determination of costs that need to be cured; but the most vital is to arrive at the proper profit after ascertaining such costs.

The study given by Mr. Harper to his problem has unfortunately been based on faulty premises; despite apparent acquiescence by the government in the principles he advocates, if he will make equal profits in any and all sizes of castings presented he will find it much easier to keep his foundry filled with profitable work by abandoning the principle of charging customers a profit on metal that they can buy elsewhere just as cheaply as he can. By all means, know your costs but also use them judiciously in fixing selling prices. Only by so doing can profits be returned.

Use and Abuse of Plumbing Brass

How Brass Goods Are Carefully Guarded Against Defects in Manufacture and Later Mistreatment.

Written for The Metal Industry by PETER W. BLAIR, Mechanical Editor

In the manufacture of valves, fittings and plumber's brass goods used to convey steam, water, gas or oil, great care is taken in the designing from the beginning to the finished product. The manufacturer today is the one who assumes the responsibility if the goods are faulty, and is responsible to the jobber, dealer and consumer.

In making pressure brass goods the losses are considerable as there are times when the defects do not develop until the last stage or operation. Then the complete article is a total loss.

A sand hole in the casting or a faulty seat or bonnet in a valve, usually discovered only after the valve is assembled and under hydraulic test means the loss of the body or bonnet except for the nominal salvage which the melting pot returns. Assuming that such a defective valve should get by all the inspection safeguards, the damage might not stop with the simple loss of all the labor expended in its manufacture. Aside from the loss of reputation as manufacturers of high grade brass goods, there is the more serious responsibility of a wrecked pipe line, a scalded workman on a high pressure steam line, or the possibility of a flooded bathroom and serious damage to ceilings and furnishings.

One sand hole is not so terrifying, as it will show up in the early stages of the manufacture of the fitting. It is the rotten or spongy casting that will give way under pressure after it has been in use ten days, more or less, which is dangerous.

Engineers, steam fitters and plumbers are educated up to a high quality of brass goods now, and are very fastidious in regards to valves and fittings. They will not stand for a slightly leaky faucet or valve, or one with a defective thread. The color of a valve, the manner of its wrapping or loose wheel may condemn it.

The manufacturers are now making a varied line of valves and fittings as they have had to do so on account of competition. Some of them are making three grades, standard, extra, special, or standard, extra and double extra. Also as a matter of precaution they give them distinguishing names and fix the pressure rate on them as suitable for 100 pounds pressure, 175 pounds, and 250 pounds, so that the valve rated for 100 pounds pressure will not be used on a line carrying 250 pounds where its failure will condemn the manufacturers entire line of valves. Also there are other strains to which the fittings are subjected, due not alone to pressure but to expansion and sagging of pipe lines, and abuse in fitting or making up.

The latter I believe is the hardest on valves and fittings. A two-hundred-pound engineer, steamfitter or plumber at the end of a two-foot pipe or monkey-wrench without half trying can so distort a valve body as to ruin the seat and make it leak like a sieve. After being subjected to such abuse no valve is safe. Highly nickel-plated fittings in both rooms are scratched and hacked up in the installation. The leading brass manufacturers maintain expensive laboratories and a force of experienced chemists together with a staff of organized inspectors throughout their plants, and with all the care exercised they have valves returned.

Since the manufacturer has stamped the pressure rating or the grade of their product on the article, however, it has eliminated considerable trouble. Every valve and all its parts are subjected to rigid examinations by inspectors and testers, who operate constantly in every department.

Should any part fail in the slightest degree to measure up to the high standard set it is rejected and referred to the Committee of Correction, which is composed of department superintendents, chief inspector and the metallurgist. However, this committee, which is called into daily conference, is but one precaution exercised to maintain the high standard. The other requirements are correct design and proportion, high grade metal, uniform castings, accurate assembling, wide margin tests and first class furnishing. Such products are made for all requirements and each piece is guaranteed for the maximum service and not merely the average. The leading brass manufacturing companies have in this way achieved results that have improved the quality and reduced the percentage on each day's scrap until it is now at a minimum figure.

Error

In our October issue some typographical errors occurred in the description of the exhibit of the Baltimore Copper Smelting and Rolling Company at the Chemical Industries Exhibition. The exhibit consisted of sheet copper in various finishes and they demonstrated the standing seam sheet copper roof, which, it is stated, in addition to having been proven correct by centuries of use, is also lightning proof. They also had on display by-products of the American Smelting & Refining Company.

The International Nickel Company's Rolling Mills

Abstract of a Description of These New Mills Which With Their Favored Location at Huntington, W. Va., Are the Most Modern and Largest Rolling Mills Devoted Solely to Production of Monel Metal and Malleable Nickel*

Many considerations led The International Nickel Company to plan the installation of its own rolling mill directly connected with its refinery for Monel Metal. In addition to the usual factors of labor supply and convenience of shipping, power supply and the like, the heating requirements involved the selection of a site having ample supplies of natural gas fuel. For this and other reasons Huntington, West Virginia, was chosen. It is a very live and progressive community of 65,000 people, located on the Ohio River, as well as on the main lines of the Chesapeake and Ohio and Baltimore and Ohio railroads, so that ample shipping facilities are assured. Electric power is supplied by the Virginia Power Company over high tension transmission lines from its station about sixty miles distant so that every necessity of manufacturing on a large scale is well provided for. Being located in the Pittsburgh-Wheeling steel manufacturing territory, Huntington, West Virginia, also provides an ample labor supply while the size and progressiveness of the community affords good living conditions for the labor employed.

A little over two years ago, The International Nickel Company acquired a tract of 80 acres about three and one-half miles south of the center of Huntington, directly adjoining the C. & O. main line tracks on the north and the Guyan River on the south. In the little over eighteen months from the day ground was first broken, a complete refining plant and rolling mill for the production of Monel Metal has been built and equipped, the buildings occupying half of the ground, or approximately 40 acres. In the design or construction of this plant, not alone the particular requirements of Monel Metal production have been given special consideration, but every effort has been made to erect a plant that would represent the last word in modern rolling mill development. With the exception of the steam required for the hammers, electric power is used throughout, the total needed for the rolling mills and their auxiliaries aggregating several thousand horsepower. Direct unit drive is used in every case and in that of the large merchant mills, the electrical control has been specially designed for this service and represents the latest development of its kind.

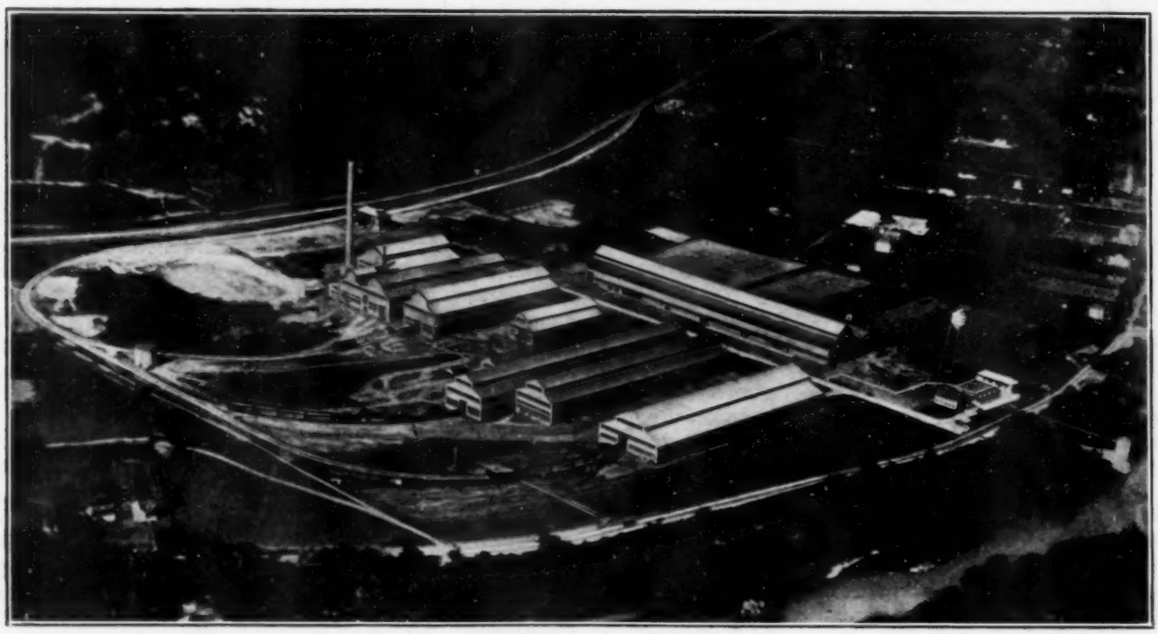
* From Inco, Third Quarter, 1922.

PERSONNEL OF THE ORGANIZATION

Not the least serious of the disadvantages of having to farm out the production of Monel Metal in the past has been the fact that it was, of necessity, worked by unfamiliar operatives. While The International Nickel Company has been developing a technical operating organization for a number of years, these skilled men could naturally only act in an advisory capacity where an outside producer was concerned.

The most important factor in connection with the opening of the Huntington mills is accordingly the fact that it will be entirely in charge of an organization that has been developed by The International Nickel Company in the handling of Monel Metal and nickel. The mills are in charge of A. S. Shoffstall as general manager, who has had twelve years experience in the handling of Monel Metal. In that time he has been through practically every department so that he is familiar with all the problems of its handling and production from start to finish.

Mr. Shoffstall is assisted by H. M. Brown, assistant general manager. Mr. Brown was for many years in charge of the C. & O. shops at Huntington,



AIRPLANE VIEW OF NEW MILLS OF THE INTERNATIONAL NICKEL COMPANY AT HUNTINGTON, W. VA.

West Virginia, and is an all around production man as well as a mechanical engineer of no mean ability. Behind these executives is an organization of men specially trained to direct their respective departments.

OUTLINE OF MONEL METAL PROCESSES

When taken from the mines in Canada, the ore is subjected to a preliminary refining process which reduces it to the form of matte. This matte will be received in carload lots from the refinery at the mines in Canada. The conveyors elevate the matte to a special type ball mill which grinds it to the consistency of coarse sand and delivers it to a large hopper.

From this hopper it is sent to the calcining furnaces, a series of which occupy most of the floor space of one of the large unit buildings, known as the matte grinding and calcining furnace department. These furnaces are all heated by natural gas, so that in this as well as in the numerous subsequent heating processes, there is no possibility of impurities entering the metal from the fuel. After passing through the calcining furnaces, the metal goes to the reverberatory furnaces and from them cast as pigs. The waste heat from the latter battery of furnaces is utilized to fire large boilers which will supply the ordinary steam requirements of the four large hammers. As a standby for the latter, natural gas fired boilers are installed in the hammer shop.

From the reverberatory furnaces the metal in the form of pigs goes to the electric furnaces where it is remelted and cast in the form of 2-ton ingots. The equipment in this department consists of one 3-ton Moore electric furnace and one 7-ton Heroult electric furnace, so that its present capacity is in excess of that of the remaining departments as at present equipped, while provision has also been made for the installation of further electric furnace units as required. So far as refining in electric furnaces and ingot casting are concerned, the handling of Monel Metal in this department does not differ materially from the usual steel mill practice.

NUMBER OF SPECIAL OPERATIONS

In the next step in its reduction to commercial form, a number of operations are involved that are entirely lacking in steel processing. In the case of steel, the ingot goes directly to the soaking pit, the time required for this part of the process is short and involves little additional expense as compared with the time and processes through which the Monel Metal ingots must go after leaving the ingot mold and before they can be delivered to the rolling mill. Steel is a metal very susceptible to oxidation and surface defects on the ingots are automatically removed by the heating and rolling processes in which the oxidation scales off, leaving clean metal. Monel Metal, on the other hand, is highly resistant to oxidation so that it is necessary to remove the outer skin of the ingot completely with its accompanying surface defects before proceeding to the heating and rolling.

Consisting chiefly of nickel and copper as it does, the metallurgy of Monel Metal is radically different from that of steel so that its successful production is naturally a highly specialized undertaking which can only be carried out by skilled men experienced in its handling. In the course of manufacture up to this point, certain defects, or oxides, are allowed to remain in the ingot. These oxides do not combine chemically with the metal but appear on or close to the surface of the ingot as physical defects. These defects, however, must be removed before the metal can undergo any further processes.

The ingots are accordingly taken to milling machines where a heavy cut is taken off each side. As an extra precaution to insure satisfactory quality the milled ingots are examined and any defects remaining are chipped out with pneumatic hammers.

EQUIPMENT PROVIDED ON A LIBERAL SCALE

After the chipping processes the ingots go back to another battery of furnaces in the hammer department,

THE 24-INCH MERCHANT MILL IN WHICH BILLETS ARE REDUCED TO SHEET BARS

where they are cogged down to bloom size. The steam hammers employed in this department range from eight ton capacity down to fifteen hundred pounds, so that ample provision is at hand for the making of special forgings of Monel Metal or nickel, in addition to the usual production of Monel Metal blooms for the rolling mill itself.

After heating in the battery of furnaces in the rolling mill department itself, these billets go to the 24-inch merchant mill for conversion into sheet bars, or to the rod mill. So far as the actual handling of the rod mill, or in its subsequent reduction in the sheet mills in another unit, there is no apparent difference between its production and that of steel. With a metal consisting chiefly of nickel and copper the greatest problems are naturally involved in the heating of it and this is equally true in every step of the process from the calcining furnace to the final annealing processes.

SOME FEATURES OF THE SHEET MILL

The bars from the merchant mill go to the sheet mill which is a most complete, specially designed plant for the production of Monel Metal sheets and which will do more to overcome the difficulties in providing an adequate supply of Monel Metal sheets than has been possible up to this time, since a very large part of the production difficulties have had to do with the rolling of sheets. In this department, as is also true of all of the others, while equipment has already been installed with a capacity far in excess of the actual requirements, ample provision has also been allowed for expansion and the installation of additional units whenever required, so that with an ample supply of high grade metal direct from its own furnaces and rolling mills, The International Nickel this being true in particular of one control of the rod mill in which the speed varies from 450 to 1,100 R.P.M.

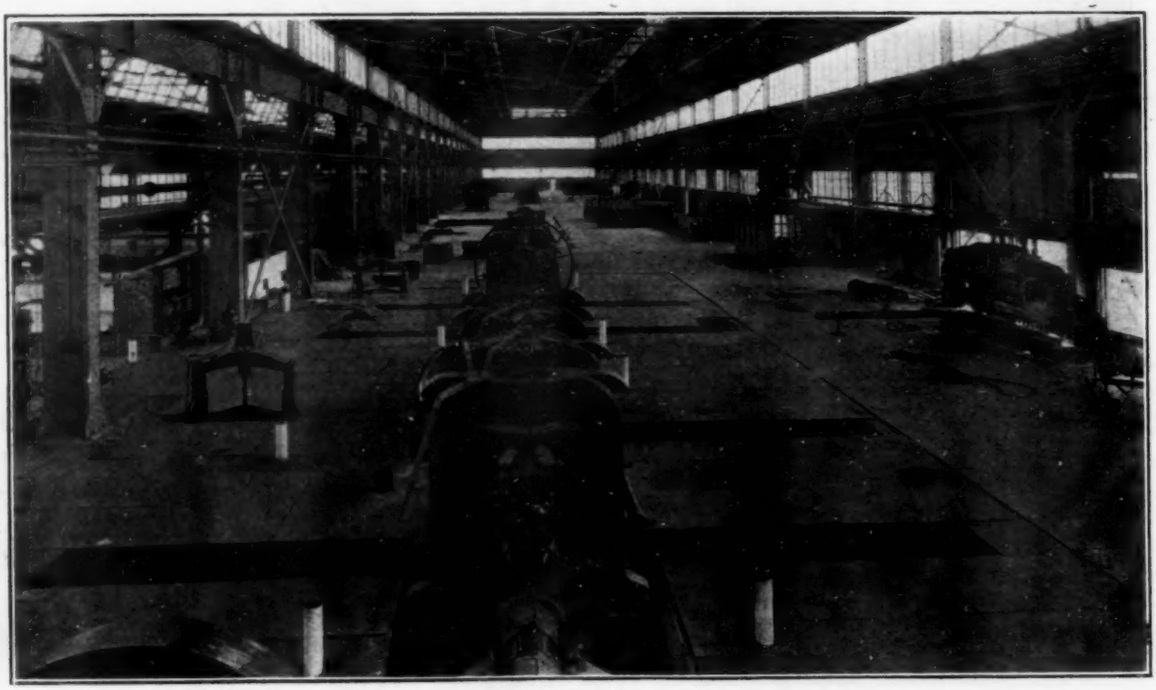
The series of units comprising the rod mill is driven by a 400-horsepower A.C. motor and a smaller D.C. motor, both of which work in conjunction with a highly specialized control system to give the great range of speed required. The necessary controls are installed in a small brick house as will be noted in several of the accompanying photographs. While these pictures show the mills in a more or less unfinished condition before production operations had actually been undertaken, they serve to give a very good idea of its size, completeness and ultimate capacity. It will be noted that in every department ample provision has been made for expansion by the addition of extra units, although as stated previously, with the equipment already installed and now in operation, the capacity far exceeds the present requirements. While the demand has shown a very marked increase since the beginning of the year, the capacity of the new mills at Huntington will be sufficient to meet all calls for sheets and rods as well as forging and special work, and at the same time permit of local stock in the warehouses of distributors.

COMPLETELY EQUIPPED LABORATORIES

With a natural alloy of such unusual and distinctive physical properties as Monel Metal, it goes without saying that the most important units at the new mills are the laboratories. They are permanently housed in a building specially planned for this purpose and completely equipped for carrying out chemical and physical tests of every nature. Both in number of commercial forms and in its appliaction in a wide variety of manufacturing processes, problems are constantly arising. The staff of the laboratories at the Huntington mills is at the service of manufacturers in solving these problems, as is also that of the research department of The International Nickel Company. In the course of more than fifteen years work of this nature, a vast amount of data has been accumulated so that frequently what appears to be a difficult problem to a manufacturer is already a matter of actual experience.

RANGE OF PRODUCTS

Both Monel Metal and Nickel will be produced at the new Huntington mills in the form of rods from 7/32-inch up to 12-inch round, square or hexagonal and in sheets from .018 to ¼-inch. These sheets will be rolled in all sizes commonly supplied in sheet steel. Special forgings in either material can also be furnished.



VIEW OF THE SHEET MILL

The Molding Machine

How the Molding Machine Is Helping the Foundry Industry

Written for The Metal Industry by W. J. REARDON, Foundry Editor

The one most interesting recent development in foundry equipment is the molding machine.

If we go back thirty years, only the hand squeezer machine was then in vogue, but since that time wonderful developments have been made. Power machines later made their appearance, hydraulic and steam, both paving the way to the present method of compressed air power, achievements which have been far beyond the wildest dreams of foundrymen of only a few decades back, in quality, as well as quantity production.

There are numerous types of molding machines manufactured today, so many that space in this article forbids a detailed review of them. However, during my thirty years in the foundry I have watched their development. Each of the different types has certain jobs that it is best adapted for, and no one of them is constructed so that it will produce profitably or efficiently every job that it is possible to rig up for machine production. However, much credit is due to the engineering and mechanical forces engaged in molding machine manufacture, in producing machines that are simple, practically fool proof, so designed that the working parts are kept free from dirt and grit which are always present in the foundry.

Ample provision for oil is an important factor as they are generally operated by unskilled men who do not take time to do much oiling.

I find that the men who are engaged in selling molding machines are well acquainted with the problems pertaining to their machines and existing foundry conditions. Their suggestions are practical and a help to foundry men in determining which type of machine will prove most efficient and profitable in handling their line of work.

The jar ram squeeze stripping plate draw roll-over features of power machines today have served the foundry well in meeting the demands of modern industry for enormous quantity production. The jar ram squeeze features, to my mind, are of the greatest value to production by molding machines, as a uniformity of the compact sand is secured, which is so essential to good molding.

Attention should be given these particular features of molding machines as a certain severity of jar may be right for one job and not for others; and the same thing is true of the squeezing. A little study of these features will eliminate a lot of molding machine troubles. Most machines can be adjusted to different conditions. The fact is that the molding machine has been developed into a high class piece of mechanism and must be given attention and care as its use in the foundry puts it under the most trying conditions that a machine with close working parts can be placed.

Molding machine pattern plates and equipment are made up with fully as great care as punch die equipment. The stripping plate pattern must be accurate as the patterns are mounted on stools and drawn through a plate or stripper of the same shape as the parting lines of the pattern. This plate is called the stripper. Patterns with a minimum amount of draft can be drawn rapidly as the edges of the sand are backed up by the stripping plate, insuring a good draw.

The split-type machine's cast iron machine plates can be mounted on the stools, and wood or metal patterns can easily be mounted on same.

The aluminum match plate has proved a great help to the foundry. The stove foundry, for instance, by using hinged match plates has increased its production enormously. There seems to be no limit to what can be accomplished with aluminum match plates, regardless of the intricacy of the patterns. The malleable iron foundries also are beginning to realize the value of the cast aluminum plate, which with the aid of both hand squeeze and power ram machines has greatly increased their production.

In making these plates a mold is made in the usual way in a flask large enough for the plate required. The mold should be made with the greatest care in order to obtain a perfect casting without any unnecessary fins. When the mold is ready to close, strips of steel the thickness of the plate desired are placed on the parting of the drag and a false parting of sand built up to the level of the strips. These may be removed if desired, the mold closed, and poured in the usual manner. Care should be taken that the flask pins are in perfect condition so that there will be no shifts. After the plate casting has cooled it should be rubbed with a fine stiff brush, which usually is sufficient finish, but any fins or irregularities must be removed with a scraper.

If suitable drawing guides are attached to suit the equipment on plates of this style and power ram machines used, a production of one hundred and fifty molds per day is not much to be expected.

There are three important features in production—the equipment, the method, and the human element. The installation of labor saving equipment such as overhead sand conveyors, sand chutes to the machines, travelling floor conveyors, and shakeout conveyors, has done away with much of the hard labor and undesirable work of the old days. It has done much to bring the foundry to its own in making the working conditions as attractive to the human element as other fields of labor.

Figure 1 shows installation in a large foundry in the middle West where twenty split type jar ram squeeze draw machines were giving a maximum production of 650 flasks from each machine in nine hours. An overhead drag sand conveyor distributed twenty-tons of tempered sand per hour to pants-leg hoppers that served each machine. A shakeout conveyor was in the center of the foundry at convenient height to dump the molds with ease. A 24-inch belt carried the sand to a bucket elevator which was lifted to a revolving riddle to a storage hopper that supplied two No. 2 Simpson mills that tempered eight cubic feet of sand per minute. The tempering of the sand in these machines made it mellow and ideal for machine molding. Ten revolving tables were set up on thrust bearings so that a push of the knee would cause the turn

table with the forty-five rammed up flasks to move to a position convenient for the molding machine man to set on or close the mold. A mono-rail trolley system conveyed a three hundred pound ladle of metal every two minutes of the nine working hours, with a switch and curved mono-rail for each table to allow the fast travelling trolley on the main line to pass to respective turn tables to be poured off.

The platform of the revolving table was made a convenient height from the floor so that the men did not need to stoop over to place the mold on the platform, pour off, or shake out. The system was planned so that no more than one step would be necessary in the performance of any operation in the plant.

This system was operated by a company producing brass castings on a quantity basis in an effort to produce the greatest tonnage at the lowest possible cost. Equipment used and problems encountered will be worth the study of foundrymen even though they may be making castings other than brass.

The molding machine with its subsidiary equipment is here to stay and the field for its operation is enormous. Give them careful study and they will open the way to many possibilities. And for the future, with technical training and helpful experience even greater possibilities are in store.

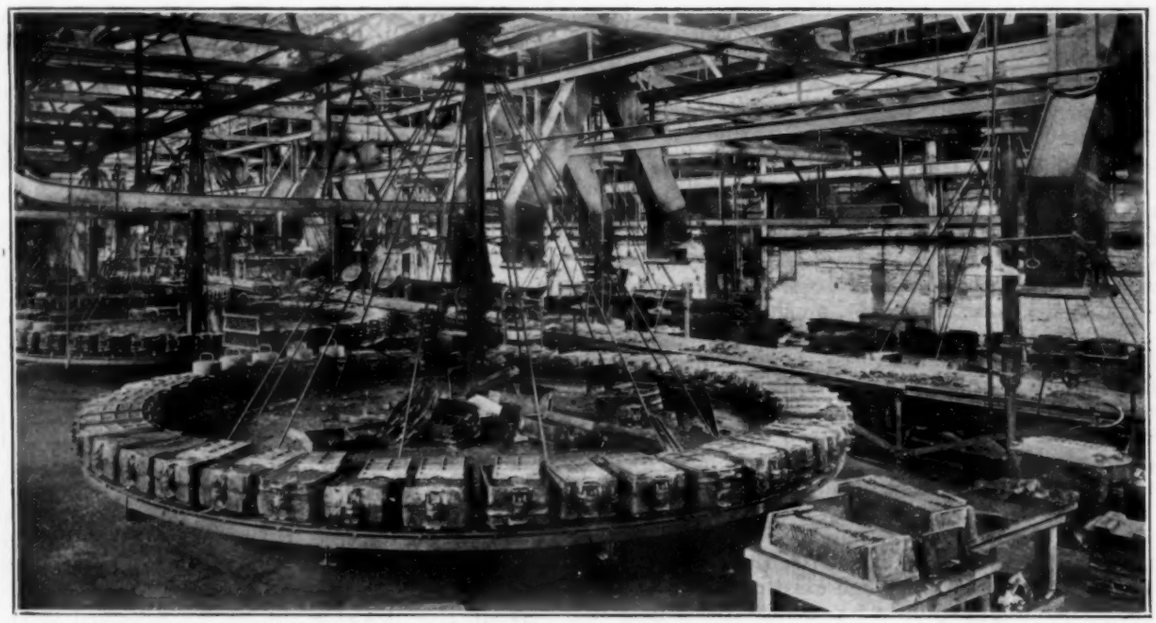


FIG. 1. MOLDING MACHINE INSTALLATION. NOTE THE REVOLVING TABLES

Plaster Molds

Q. I am enclosing herewith some sample pieces of a very small casting which I had manufactured, but of which I was only able to obtain a very few usable pieces.

I have since been experimenting with the casting of the same myself, but due to my lack of knowledge at the start and in fact still I have been unable to make much progress, another handicap is evidently the size and intricacy of the piece.

Most of my experiments have been with a metal mold although I have tried plaster.

From the examination of these samples could you advise me in what medium they were molded, the manner of molding and coring and of what alloy you think they were made?

In your October issue you published an article entitled "Permanent Molds," and I would thank you also if you would advise me whether you think that either of the formulæ mentioned in this article would be available in the casting of this, and if so could you give me the quantities and other data regarding the making of such molds?

The metal requirements for this casting are such that the metal must have a resonance similar to the brasses, bronzes and copper. Otherwise, as to strength, etc., the requirements are slight or almost negligible.

A. On examination of this casting I would say that it was cast in a plaster mold. There is a considerable amount of this work being done at the present time and the casting resembles die castings. One of the mixtures used by one concern that makes a business of this class of work is composed of 80 per cent plaster of paris and 20 per cent line. The plaster and lime mixed as wanted and poured in the specially prepared gate of castings. The castings are generally mounted on a plate and a close-fitting iron band snap flask is used. As soon as the plaster is set the pattern is drawn by a stripping method, that is, the plaster is drawn through a guide. It assures a perfect fit. The mold is dovetailed so that the cope fits the drag, and the flask is removed and the mold is placed in a specially designed oven that draws out the moisture and maintains an even temperature, which is regulated according to the job. The molds are generally baked all night, removed in the morning, put together and poured with a mixture of metal, about 58½ copper, 41 zinc and ½ aluminum. Castings made by this process are very accurate. It is best to hire a man familiar with this class of work.—W. J. REARDON.

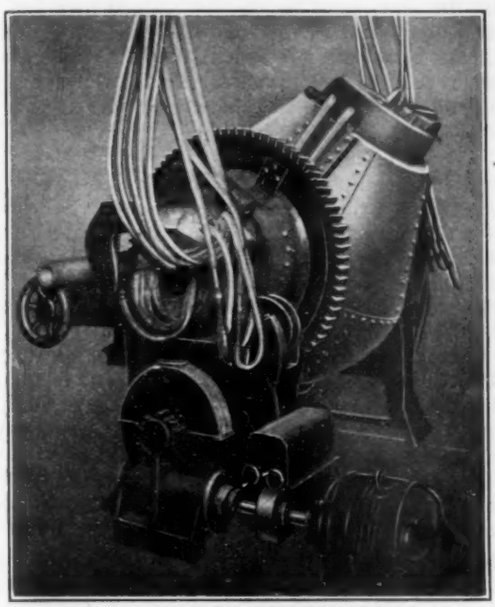
Hawley Electric Furnace

A New Electric Furnace Based on the Use of the Indirect Arc in the Body of an Oil Burning Furnace Body

The Hawley electric furnace is designed for the melting of non-ferrous metals and alloys.

The principal characteristics of the Hawley electric furnace are given as follows:

First: Heat is generated by an electric arc passing between two horizontal electrodes; this is the so-called "indirect" arc type of furnace.



HAWLEY ELECTRIC FURNACE

Second: The shell of the Hawley electric furnace is that of the well known Schwartz oil burning brass melting furnace, which has been prominent for many years.* The design of this furnace is such as to permit pouring either into ladles or directly into the molds (when a crane is used), and is such that it may easily and conveniently be charged either by hand or mechanical arrangement with the furnace in either a horizontal or vertical position, permitting charging either from the floor or from overhead.

Third: The claim is made that the shape of the cauldron has many advantages; all metal is melted equidistant from the arc; the shape of the cauldron is such that there is no possibility of the ends bulging, getting the electrodes out of alignment; cauldron being absolutely rigid cannot lose its shape under the most trying conditions; the shape of the cauldron also permits the use of linings which are interlocking and hold tighter to the shell giving longer service.

Fourth: Furnace is equipped with an automatic oscillating mechanism so that during the period of melting charge is kept mixed, resulting in an alloy free from segregation; overheating of the surface and volatilization of zinc is prevented and furnace walls are kept washed by charge, increasing the life of the lining. Washing the furnace walls also decreases heat radiation, thereby resulting in greater thermal efficiency and avoiding the storing up of heat in lining. Furnace is oscillated on Hyatt roller bearings reducing friction to a minimum.

Fifth: The door is claimed to be a great improvement over other doors used with electric furnaces; the large door makes it possible to charge very large pieces. This large door is also a great advantage in slagging off and the peep door gives operator an opportunity to inspect his metal at all times, or can be left open at the beginning of the heat to allow gases to escape.

The Hawley electric oscillating furnace is now built in but one size:

1,200 pounds capacity; 150 K. V. A.

Two other sizes are being designed and will shortly be on the market, as follows:

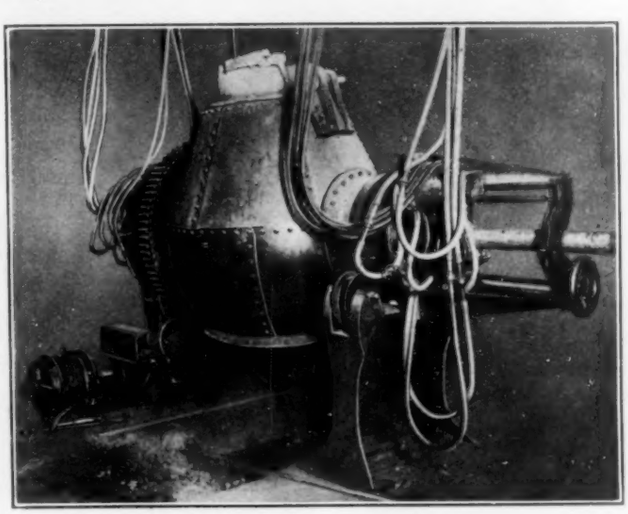
600 pounds capacity; 75 K. V. A.
2,500 pounds capacity; 300 K. V. A.

With each furnace is furnished a single phase furnace transformer of approved design; motor for oscillating and automatic and hand control mechanism for same, together with integrating watthour meter, indicating wattmeter, solenoid operated high tension oil switch, manually operated full automatic high tension oil circuit breaker, electrodes and refractory linings suitable for ordinary brass alloys.

Transformer is of sufficient size to furnish the current required to melt charge of metal in approximately one hour.

Lining consists of three courses of special refractories designed to effect high insulation as well as to prevent erosion and disintegration of inner lining. Suitable electrodes and electrode cooling devices are incorporated in the furnace design together with means for adjusting the electrodes and thus regulating the rate of heat input. Electrode cooling device is included and said to decrease electrode consumption to a minimum.

The Hawley electric furnace is manufactured by the Hawley Down Draft Furnace Company, and sold by F. H. Niles & Company, Woolworth Building, New York City.



HAWLEY ELECTRIC FURNACE

*A design very similar to this was described by W. J. Reardon, Foundry Editor of THE METAL INDUSTRY, in our issue of May, 1920, pages 207-210, under the title, "Electric Melting in an Oil Furnace."

Technical Control of the McCook Field Foundry

The System of Control for a Foundry Making Aircraft Castings*

By E. H. DIX, Jr., Dayton, O.

Until recently the foundry has not received earnest consideration from scientific and technically trained men. For example, it is only within the past few years that it has been possible to measure the temperature of molten metals by a satisfactory method. Even at the present time, the old time foreman is skeptical as to the real paying value of technical methods. In part this attitude is just, because there have been many instances where new methods have been tried and discarded, perhaps through faults, through lack of a thorough understanding of their application, or both.

There are certain classes of work which still can be made satisfactorily by the old methods, but to meet the demands of aircraft construction the practical foundryman needs the aid of the latest scientific methods and instruments in the hands of technically trained men. In other words, strict technical control must be exercised in the foundry as it is in the heat-treating room and in other branches of industry.

In order that the Engineering Division of the Air Service might obtain information relative to foundry problems at first hand, a small experimental foundry was established at McCook field, Dayton, O. At first the work consisted chiefly of experimenting with the test bars of various nonferrous alloys. It soon was realized, however, that in order to be of practical value, the scope of the foundry would have to be enlarged so as to make actual castings of the alloys experimented with. From this it was a short step to supplying all of the nonferrous castings for the large machine shop building experimental parts for aircraft. Patterns of dubious design are tried out in this foundry and the difficulties remedied before the work is let out on contract.

As the foundry is under the direct supervision of the Metallurgical Branch of the Material Section, it has at its disposal the services of technically trained men and all of the latest equipment. As a result, a system of technical control has been built up which should be of more than passing interest to the practical man, even though the demands on his product may be less exacting.

MELTING EQUIPMENT

The melting equipment of the foundry is shown in Fig. 1. From left to right these furnaces are: A Monarch-type No. 20, stationary crucible furnace, a Hausfeld-type No. 400, crucible tilting furnace, and an Iler-type No. 40, stationary crucible furnace, all arranged for oil or gas fuel. Recently a 10-inch electric crucible was installed. This is shown in the foreground of Fig. 2. This furnace is a recent development of the induction type electric furnace, the heat being generated directly in the metal by a high frequency current. For metals of high conductivity, such as copper and aluminum, a special crucible is used and in this case the crucible walls are heated by the induced current. This furnace is capable of attaining exceedingly high temperatures and is desirable for the manufacture of hardeners containing metals of high melting points. An electrically-heated core oven with

*A paper read at the Rochester meeting of the American Foundrymen's Association, June 5-9, 1922.

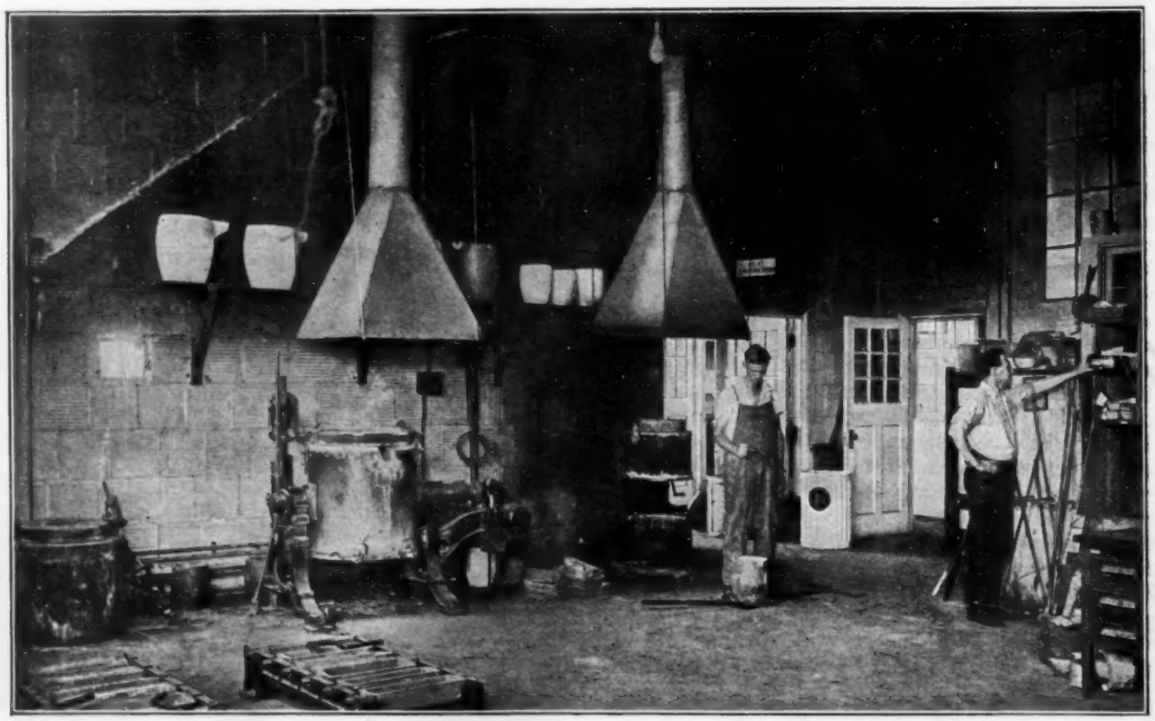


FIG. 1. MELTING EQUIPMENT AT THE McCOOK FIELD FOUNDRY

thermostatic control may be seen at the extreme right of Fig. 1. This oven is desirable for experimental core work.

THE FOUR DIVISIONS OF TECHNICAL CONTROL

The technical control of the foundry may be grouped under the following headings: Temperature control, chemical analysis, physical testing, and metallographic examination. These four headings will now be discussed separately.

TEMPERATURE CONTROL

The advantage of careful temperature control cannot be too strongly emphasized. The maximum furnace temperature and the pouring temperature strongly influence the structure and physical properties of all metals and alloys. This is particularly true of aluminum alloys in which case it is known that the lower the pouring temperature, the more dense the structure and the stronger the alloy. It is true that the experienced melter handling the same metals day after day becomes expert in judging temperatures, but there can be no doubt that differences in atmospheric conditions will cause even the most experienced to fall down at times in judging the correct temperature of the metal. For instance, a pot of aluminum alloy which looks red in the comparative darkness of the furnace room assume a dull silvery lustre when taken out into the sunlight. Bright and cloudy days produce corresponding differences in the appearance of the metal. Also, where a number of different alloys are handled, the judgment of the correct temperature becomes increasingly difficult.

It is possible at the present time to measure the temperature of molten aluminum satisfactorily in several different ways. The ordinary base metal thermocouple wire may be used in a light wrought iron or cast iron protecting tube. This is satisfactory if the thermocouple is to be allowed to remain in the bath of metal, as for instance, in holding furnaces. However, if a quick reading is desired, the protecting tube produces too great a lag and is not satisfactory. For a quick reading, an iron constantan pyod has been found satisfactory. This is made up of a constantan wire enclosed in a light iron tube and welded to it at the end; thus the iron tube acts as one element of the thermocouple and at the same time as a protecting tube. Although the manufacturer does not recommend its use in molten aluminum without a protecting tube, it has been found in our foundry to give satisfactory results. Recently we have been using chromel-alumel wires of No. 6 gage without any protecting tube. These wires are spread apart above the weld about 4 inches so as to prevent short circuiting through the metal. The weld, of course, burns off after a number of readings have been taken, but the wires can be re-welded until completely used up. This couple gives an even quicker reading than the pyod but it is liable to error due to short circuits across the metal.

For measuring the temperature of brass and bronze, the protecting tube presents a much greater problem inasmuch as the temperatures are higher and it is difficult to obtain an alloy which will not be attacked by the brass or bronze. However, a chromon tip protecting tube recently has been perfected which gives highly satisfactory results. Any type of base metal couple can be used in the tube, but in our foundry the chromel-alumel wire is used exclusively.

All of these couples are used in conjunction with a Hoskins-type millivolt meter of the high resistance type. Flexible leads of the same material as the couple are used so that the cold junction is carried to the meter. The meter is located in a relatively cool place so that the error caused by cold junction variations is small. The couples are frequently checked by the freezing point of

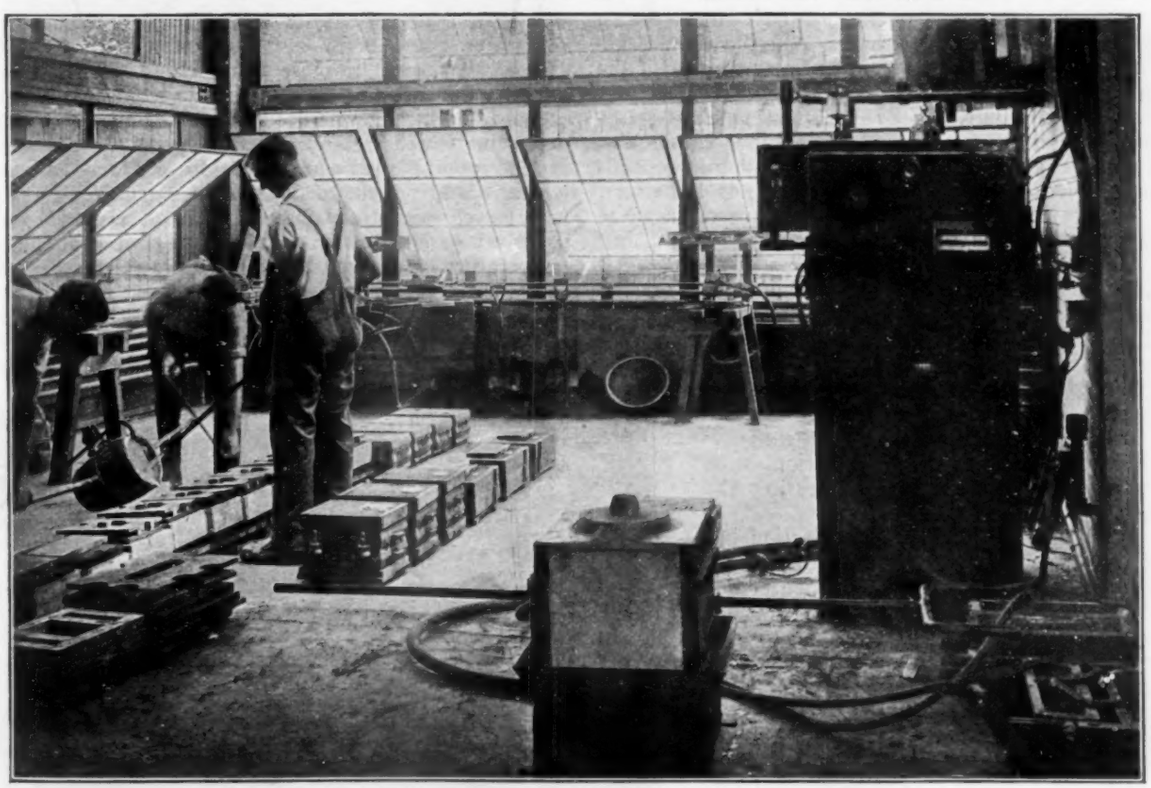


FIG. 2. ELECTRIC CRUCIBLE FURNACE AND MOLDING FLOOR

salt. Fig. 1 shows the temperature of a pot of aluminum being taken, using the chromel-alumel couple.

The following maximum furnace temperatures and pouring temperatures have been adopted for the usual run of work, although, of course, they are varied to suit unusually heavy or very thin castings:

ALLOY	Melting point liquidus, deg. Fahr.	Maximum furnace temperature deg. Fahr.	Pouring temperature deg. Fahr.	
Cu 8, Al 92	1148*	1400	1200	1300
Cu 10, Al 90	1130*	1400	1200	1300
Cu 85, Sn 5, Zn 5, Ph 5	1788**	2000	1950	
Cu 88, Sn 10, Zn 2	1825**	2200	2050	
Cu 80, Sn 10, Pb 10	1735**	1950	1900	
Cu 60, Zn 37+3 Hardener	1600**	1800	1700	1750

CHEMICAL ANALYSIS

The chemist is essential for the satisfactory operation of the foundry. He carefully analyzes the raw material which is always purchased according to definite chemical specifications. He analyzes the rich alloys made up for introducing metals of relatively high melting points and the proportion in which these hardeners are used is based on his analyses. Finally, he analyzes the alloys as mixed to determine if the metals are in their proper proportion and to see that an unduly large amount of impurities has not been introduced during the melting.

PHYSICAL TESTING

The physical testing laboratory furnishes the ultimate check on the quality of metal produced. Unfortunately, it seldom is possible to test the actual castings produced in the foundry because to do this would be to destroy the casting. It therefore is necessary to make tests on special bars cast from the same metal, and therein lies the greatest difficulty in connection with the testing of casting alloys, that is, to obtain a specimen truly representative of the metal. Many erroneous conclusions have been drawn through the use of faulty test bars. It is the usual practice with large castings to cast, as an integral part of the casting, a coupon from which is machined the test bar. This test bar is required to meet certain physical specifications. The experienced foundryman knows that he can obtain various physical properties in the test bar, depending upon its location with respect to the gates and risers. Thus, to meet a certain specification it is merely a game for the manufacturer to select the position on the casting which will allow the test bar to meet the specification. Specifications usually read that the location of the test bar shall be agreed upon between the inspector and the manufacturer, but of course the manufacturer, having much more experience in this connection, can easily persuade the inspector that his selection is the correct place for the test bar. Thus, instead of being concerned with improving his product to meet the specification, he is dodging the specification by outguessing the inspector.

For the past year, the Material Section has been much concerned with standardizing the method of casting the test bars of the nonferrous alloys used in aircraft construction and has adopted several which have been found to give satisfactory results. The choice of a method of casting test bars should be based on simplicity, uniformity of results, and results as nearly as possible comparable to values obtained in actual castings. In regard to this last item, it must be realized that no test bar can represent the physical properties of different parts of a casting because physical properties vary from section to section, depending upon the thickness, the proximity to gates and risers and upon whether in the bottom or top of the casting. After taking all of these things into consideration, it has been decided that the separately cast test bar is much more satisfactory than the bar which is cast as an integral part of the casting. By adopting a separately cast test bar the method of gating may be specified once and for all, and this cause for disputes between the inspector and the manufacturer will be eliminated. By adopting a uniform method, data will gradually be accumulated which will result in fair specification values for different alloys.

In order to furnish information for the designers, it is the policy of the foundry from time to time to cut small test bars from castings and to compare physical properties of these with the results obtained from the standard test bar cast from the same melt. These tests give average figures which are satisfactory for parts designed with a large factor of safety. However, in the design of aircraft parts, it is always necessary to reduce the weight to the absolute minimum; thereore, the castings must be designed with a more intimate knowledge of the physical properties obtained. The following procedure is suggested for important castings which are highly stressed. The casting is designed and the pattern made up from the best available knowledge of the physical properties of the alloy to be used. This pattern is then turned over to the foundry and three or four castings made, using as many different methods of gating as may be deemed necessary. These are all poured from the same melt of metal from which is also poured a mold of standard test bars, and the pouring temperature carefully noted. It sometimes may be necessary to try several pouring temperatures in order to select the one giving the strongest and soundest castings. The castings then are tested in a manner which duplicates the service condition as nearly as possible. From the results of these tests it is possible to decide whether the casting is strong enough to meet the requirements for which it was designed and at the same time to determine which method of gating gives the best results. If one of the methods of gating produced a casting which would satisfactorily meet the requirements, then it is merely a matter of seeing that all castings on that order are gated in the same way and poured at the same temperature and that the standard test bars cast from each melt are at least as good as the test bars cast from the experimental heat.

Fig. 3 shows the methods of casting test bars of aluminum alloys, which has been definitely adopted by the

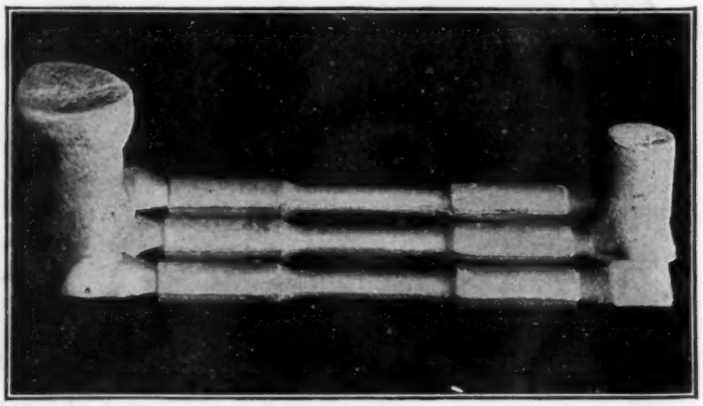


FIG. 3. METHOD OF CASTING ALUMINUM ALLOY TEST BARS

*From the equilibrium diagram given in the Bulletin of the American Institute of Mining and Metallurgical Engineers, No. 150.

**From Technical Paper No. 60 of the Bureau of Mines.

foundry for all experimental and inspection work. This method is simple, requires a small amount of metal, and gives uniform and dependable results, which, while usually slightly higher than test bars cut from castings, yet are not sufficiently high to be misleading to designers. The middle bar may be omitted if desired. This same method is being used for red brass and gun metal. It seems to be perfectly satisfactory for red brass, but with gun metal it has been noted that the middle bar is frequently much stronger than the two outside bars. It is suggested that the reason for this is that the metal flows directly from the pouring head down through the middle bar and does not flow into the two outside bars until it begins to back up in the riser. Recently a number of comparisons have been made between the test bars cast in this manner and those cast from the same pattern, but with the middle bar stopped off, and it has been found in every case that with the bars cast two in a mold the two results are uniform and consistently as high as the middle bar of the mold where three are cast together. One or both of the outside bars of this latter mold are usually low.

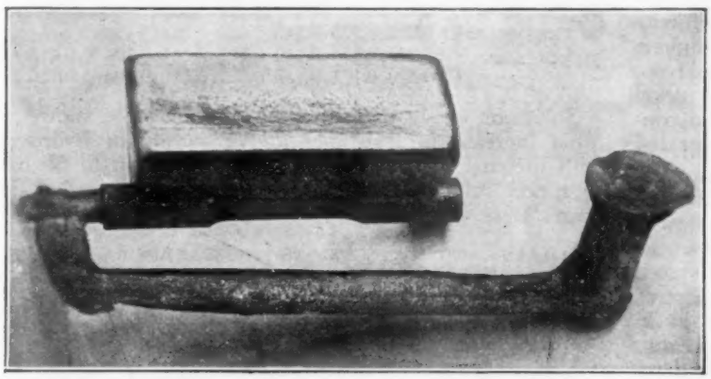


FIG. 4. METHOD OF CASTING MANGANESE BRONZE TEST BARS

Fig. 4 shows the method adopted for manganese bronze and other high shrinkage alloys after a great deal of experimenting. The complete results obtained in these series of experiments may be found in a paper by the author presented at the 1921 meeting of the American Society for Testing Materials.

METALLOGRAPHIC EXAMINATION

It often happens that the chemical analysis is entirely satisfactory and yet the physical properties are below standard. In such cases it is necessary to turn to the metallographic examination of the alloy for an explanation. This subject is far too broad to permit a discussion at the present time, but it may be stated that the foundry obtains microphotographs of the structures of test bars as a matter of routine record. These are carefully filed and in the course of time will furnish satisfactory information relative to the value of metallography as a branch of technical control of the foundry.

CORRELATION OF TESTS

The most important part of the technical control is the correlation of the four branches just discussed. This can only be obtained by careful and accurate records. The forms used in the foundry are reproduced in Fig. 5 and 6. Fig. 5 is the stock card. As soon as metal is received

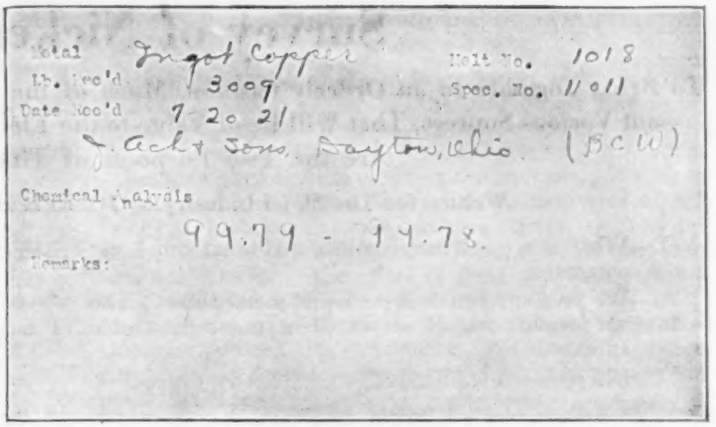
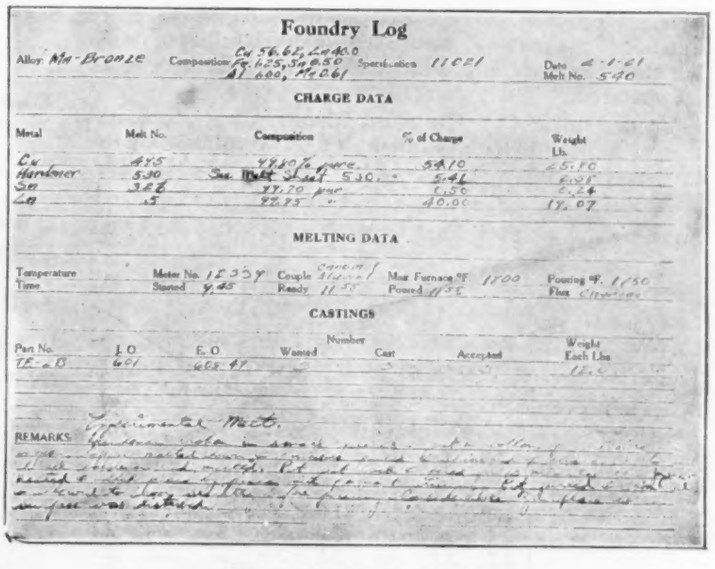

Metal Ingot Copper Melt No. 1018
Lb. Rec'd 3009 Spec. No. 11011
Date Rec'd 7 20 21
J. Ach & Sons, Dayton, Ohio (BCW)
Chemical Analysis
99.79 - 99.78.
Remarks:

FIG. 5. METALS STOCK CARD

from the outside or made up in the foundry for future use, it is entered on this card. It is identified by a melt number. The melt numbers are consecutive numbers given to each pot of metal melted in the foundry or each lot of materials received from the outside. The complete information relative to any melt is given on the foundry log sheet, having the corresponding melt number. This form is shown in Fig. 6. There is also a combined data sheet containing the information from the foundry log, the physical test results, and the chemical analysis; thus, the full information is contained on one sheet and it is not necessary to look through several sets of files in order to obtain this information. An additional form is used for the metallographic record. This also contains the physical properties and chemical analysis of the specimen photographed.

CONCLUSIONS

In conclusion, let it be definitely realized that technical control is a tool to aid the practical skill of the foundryman; it is not black magic which can replace long years of toil over the fires. Implicit faith in the pyrometer may lead to more rejected castings than the total absence of any temperature measuring device. A pyrometer cannot take the place of an experienced melter; pyrometer installations have the habit of getting out of order just at the time they are most needed.


Foundry Log

Alloy Mn-Bronze Composition Cu 56.62, Zn 40.0, Fe 1.25, Sn 0.50, Al .600, Mg 0.61 Specification 11021 Date 2-1-21 Melt No. 5340

CHARGE DATA

Metal	Melt No.	Composition	% of Charge	Weight Lb.
Cu	475	99.50% pure	58.10	45.50
Hardener	530	Spec. Melt Sheet 530.	5.44	4.26
Sn	328	99.20 pure	1.50	1.24
Zn	15	99.75 "	40.00	31.07

MELTING DATA

Temperature Time — Meter No. 12337 Started 4.45 — Couple Ready 11.55 — Max Furnace °F 1800 Poured 11.55 — Pouring °F. 1750 Flux Charcoal

CASTINGS

Part No.	L O	E O	Number Wanted	Cast	Accepted	Weight Each Lbs.
TE-B	601	665-47				16.2

REMARKS: Experimental Melt.

FIG. 6. FOUNDRY LOG SHEET

Survey of Nickel Solutions

To Bring Together in an Orderly Fashion, Much of the Data on Nickel Solutions Scattered Throughout Various Sources, That Will Be of Value to the Electro-Plater and to Refute Some Statements Are the Two Purposes of This Article. Part 2*

Written for The Metal Industry by JOSEPH HAAS, Jr., Plating Superintendent

Q.—What is a good metal polish, and what can I use for a container?

A.—We presume you desire a liquid metal polish. The following formula makes an excellent non-inflammable metal polish:

Carbon tetrachloride	3½ gallons.
Ammonia water 26%	2 lbs.
Naphtha	4 "
Red Oil	6 lbs.
Finely powdered silica	19 lbs.

Use care in getting the finest powdered silica otherwise plated finishes like nickel or silver will be cut too fast. The addition of some English floated whiting to the silica is sometimes advisable. Regular tin cans make the best containers.—C. H. P.

While the previous experiments were conducted with solutions that contained only 12 ozs. of nickel sulphate to the gallon from which good nickel deposits could not be obtained without the proper addition agent, good nickel deposits can, however, be obtained from a solution containing only the single sulphate when more concentrated solutions are employed.

A series of experiments with increasing concentration of nickel sulphate from 12 to 56 ozs. per gallon, showed that with increasing concentration, and such factors as external resistance, electrode surface, electrode distance and temperature being kept constant, the green deposit disappeared. At 24 ozs. it was scarcely perceptible; at 28 ozs. there was no green deposit, but a streaked and discolored nickel deposit; at 32 ozs. and more, perfectly good deposits were obtained. The amount of gas given off at the cathode also decreased, being between 32 and 40 ozs., scarcely perceptible. For various reasons that will become evident from a study of the following table, solutions of a higher concentration than 32 ozs. should not be employed. The deposits from nickel solutions containing 32 ozs. nickel sulphate are very white and easily colorable. Until the concentrated solutions come to more extended use among platers, it is impossible to state whether there are any disadvantages or difficulties to be encountered.

To determine (1) The effect of increasing concentration of nickel sulphate solution. (2) The solution of the least resistance.

TABLE NO. 1—30 GALLONS OF SOLUTION

Solution	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8
Ozs. nickel salt per gallon	12	16	20	24	28	32	36	40
Ozs. metal per gallon	2.6	3.4	4.3	5.2	6.	6.8	7.7	8.5
Temperature	68°F.	68°F.	68°F.	68°F.	68°F.	68°F.	68°F.	68°F.
Distance between electrodes	6¼"	6¼"	6¼"	6¼"	6¼"	6¼"	6¼"	6¼"
Area of electrodes	sq.ft. 2	sq.ft. 2	sq.ft. 2	sq.ft. 2	sq.ft. 2	sq.ft. 2	sq.ft. 2	sq.ft. 2
Voltage E	1.3	1.1	1.1	1.0	...	...	...	...
	2.4	2.3	2.1	2.0	2.0	2.0	2.0	2.1
	3.7	3.9	3.6	3.5	3.6	3.7	3.6	3.7
Amperage I	4	4	4.2	5.0	...	...	...	...
	9	10.6	11.4	12.4	12.6	13.4	12.8	12.6
	15	20.4	20.4	24.0	26.2	28.8	27.1	25.2
Polarization E^1	0.4	0.4	0.5	0.4	...	...	...	...
	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6
	0.4	0.4	0.5	0.6	0.7	0.7	0.7	0.7
Action at cathode	Green salt deposited; considerable gassing.	Green salt deposited; considerable gassing.	Decrease of green deposit; still considerable gas.	Decrease of green deposit to a thin film; not much nickel deposited; still considerable gas.	No green deposit; discolored nickel deposit; decrease of gas.	Good white nickel deposit; very little gas.	Same as in No. 6.	Same as in No. 6.
Resistance $R = \frac{E-E^1}{I}$	0.222	0.175	0.143	0.120	....	....	....	....
	0.222	0.179	0.140	0.121	0.111	0.104	0.109	0.119
	0.220	0.171	0.147	0.121	0.110	0.104	0.107	0.118

Solutions above that of No. 8 in the table showed a rapid increase in resistance and evolution of hydrogen with increasing concentration. However, up to 56 ozs. of nickel sulphate per gallon good colorable nickel deposits were obtainable.

SUMMARY AND CONCLUSIONS FROM EXPERIMENTS DETERMINING WHETHER CURRENT DENSITY HAD ANY EFFECT ON DEPOSITION OF BASIC SALTS AT CATHODE FROM NICKEL SULPHATE SOLUTIONS

Steel cathode; cast nickel anodes 92-94 per cent; 68 degs. F.; 6¼-inch electrode distance; area of electrodes 2 square feet, 20-minute electrolysis.

TABLE NO. 2. 30 GALLONS OF SOLUTION

Concentration nickel sulphate per gal.	Voltage	C.D. per sq. ft.	Polarization	Deposit at Cathode
8 ozs.	1.4	1.6	0.4	Greenish, iridescent, deposit; gas evolved.
	2.3	2.8	0.5	Greenish salt; gas evolved.
	3.5	4.7	0.5	Increase of green deposit; increase of gas.
	4.5	6.4	0.5	Green deposit, increase of gas.
	5.3	7.2	0.5	Green deposit; gas.
12 ozs.	1.3	2.0	0.4	Green deposit; gas.
	2.4	4.5	0.4	" " "
	3.7	7.5	0.4	" " "
	4.5	9.0	0.5	" " "
	5.5	11.0	0.6	" " "
16 ozs.	1.1	2	0.4	Green deposit and gas.
	2.3	5.3	0.4	" " " "
	3.9	10.2	0.4	" " " "
	4.5	11.4	0.5	Increase of green deposit and gas.
	5.5	14	0.6	" " " " " "
20 ozs.	1.1	2.1	0.5	Decrease of green deposit and gas.
	2.1	5.7	0.5	Green deposit and gas.
	3.6	10.2	0.5	" " " "
	4.6	14.1	0.5	Increase of green deposit and gas.
	5.4	16.9	0.5	" " " " " "

24 ozs.	1.0	2.5	0.4	Scarcely perceptible green deposit; considerable gas.
	2.0	6.2	0.5	Scarcely perceptible green deposit; considerable gas.
	3.5	12.0	0.6	Scarcely perceptible green deposit; considerable gas.
	4.5	16.1	0.6	Scarcely perceptible green deposit; considerable gas.
	5.5	20.2	0.6	Increase of green deposit fairly heavy, considerable gas.
28 ozs.	2.0	6.3	0.6	No green; white thin streaked deposit; gas.
	3.6	13.1	0.7	No green; white thin streaked deposit; gas.
	4.8	18.6	0.7	Slight perceptible green, considerable gas.
	5.4	21.4	0.7	Increase of green and gas.
32 ozs.	2.0	6.7	0.6	White nickel deposit; very little gas.
	3.7	14.4	0.7	" " " " " "
	4.5	18.3	0.7	White nickel; increase in gas.
	5.6	22.5	0.8	White nickel; heavy on edges, but not burnt; considerable gas.

The result of this series of experiments directly contradicts the statement in Langbein's 8th edition, page 308, in that it shows that the current density has the opposite effect of that which Langbein tried to convey. These experiments show that with increasing current density, the basic salts deposited upon the cathode increase; also that high current density is a favorable condition for the deposition of basic salts, inasmuch as in the higher concentrated solutions with low current density the deposited basic salts decreased, and when higher current densities were employed, the basic salts again would appear in greater amounts. The final conclusion to be reached is that the composition of the solution and not the current density determines the deposition of basic salts upon the cathode.

EFFECT ON RESISTANCE OF NICKEL SULPHATE SOLUTION BY VARIOUS SALTS

Having determined the nickel solution with the lowest resistance (No. 6, Table I), the next object was to determine the effect of various chemicals toward lowering the resistance of No. 6.

For this purpose (the effect on the resistance of a nickel sulphate solution) the following substances were added: Boric acid, nickel chloride, sodium citrate, sodium sulphate, magnesium sulphate, sodium chloride and ammonium chloride. The effect of these additions was that boric acid did not affect the resistance at all; nickel chloride, sodium chloride, sodium sulphate, ammonium chloride reduced the resistance considerably; sodium citrate reduced resistance very slightly; magnesium sulphate increased resistance very slightly.

Additional work was also done by the regular technical method regarding the resistance of the nickel sulphate solution by adding chemicals in concentration generally added in plating practice, with the result that the following chemicals are arranged in the order of increased resistance or, in other words, in the order in which they should be chosen as agents for decreasing the resistance of the nickel sulphate solution. Sodium chloride, ammonium chloride, sodium sulphate, sodium fluoride, nickel chloride, sodium citrate, magnesium sulphate.

In Langbein's 8th edition, page 306, objection is stated to the use of chloride salts in nickel solution for depositing upon iron and steel due to the ease with which objects plated in such baths rust. Practical experience hardly warrants such a statement, as the use of chlorides is quite extensive among platers, and where the bath is closely controlled chemically, especially as regards acidity, no greater tendency toward rusting is experienced in chloride baths than in baths where chlorides are absent.

Gold on Aluminum

Q. How can I plate gold on aluminum?

A. To gold plate aluminum successfully it is necessary to make use of a basic solution that will not only reduce the film of oxide always present on aluminum, but at the same time to deposite a secondary metal that will protect the aluminum from further oxidation, and at the same time give an excellent basis for gold, silver, copper, or brass deposits that may be necessary to apply.

A solution for the purpose outlined is an alkaline zinc solution, prepared as follows:

Water	1 gallon
Sodium Cyanide	4 ounces
Zinc Cyanide	4 "
Caustic Soda 76%	2 "
Soda Ash 58%	2 "
Aqua Ammonia 26%	1 "

Temperature 110 deg. Fahr. at 4 to 5 volts. Pure zinc cast or sheet anodes.

The articles made of aluminum should be cleansed under the correct conditions employed for aluminum, and then plated in the zinc solution for a minute or two until a uniform zinc deposit is obtained. After zinc plating the articles should be washed thoroughly and plated in a regular cyanide brass solution, prepared as follows:

Water	1 gallon
Sodium Cyanide	5 ounces
Copper Cyanide	3 "
Zinc Cyanide	1 ounce
Bicarbonate of Soda	1 "
Ammonium Chloride	½ "

Temperature 80 deg. Fahr., 4 volts. Use cast brass or heavy sheet anodes. After brass plating for a short time remove from the solution, wash thoroughly in cold water, and scratch-brush or lightly buff as desired. The gold plate in the following solution:

Water	1 gallon
Sodium Cyanide	½ ounce
Gold Chloride	½ "
Phosphate of Soda	½ "
Bisulphate of Soda	¼ "

Temperature 140 deg. Fahr. Voltage, 2½ volts. Use fine gold sheet as anodes.

If copper plating is more desirable than brass, previous to gold plating, then the following solution may be used:

Water	1 gallon
Sodium Cyanide	4¾ ounces
Copper Cyanide	4 "
Bicarbonate of Soda	1 ounce
Bisulphite of Soda	½ "
Hyposulphite of Soda	5 grains

Temperature 110 deg. Fahr. Voltage, 4. Use cast or sheet copper as anodes.

If this data is followed carefully, aluminum may be successfully plated in any of the metals mentioned.—C. H. Proctor.

Brush Brass

A Description of Past and Present Methods Used for Producing a Brush Brass Finish

Written for The Metal Industry by ROBERT S. LEATHER, Lea Manufacturing Company, Waterbury, Conn.

Until a comparatively short time ago a brush brass finish was considered by most manufacturing concerns a mean job. When brush brass first came into prominence the article to be brushed was covered with a mixture of oil and pumice and then with the aid of a hand brush this mixture was thoroughly rubbed over the surface to be finished. After brush brass came into greater prominence brass wire wheels and Tampico wheels were used to speed up production. Mixtures of oil and pumice or water and pumice were most generally used. In using either mixture the work to be finished was first cut down. In the case of flat pieces an emery wheel was used but with shells or rounding surfaces it was necessary to use a rag wheel for the cutting-down operation. When a rag wheel was used, the cutting compound being of a greasy nature, it was necessary to clean the work thoroughly and remove every trace of grease before the water and pumice mixture could be used. If oil and pumice were used it was unnecessary to wash the work. Both pumice mixtures had their advantages and it was a matter of opinion which was the better. With either method it was a nasty job for most of the moist pumice flew from the wheel as soon as it was put on. On account of the layer of moist pumice on the work the workman was at a disadvantage, for he could not tell how the finish looked until the work was washed. Besides being a dirty job on account of the flying wet pumice this method proved to be very inefficient. After being brushed it was necessary to clean the work thoroughly and dry it in saw dust. In doing this a certain amount of the work was always stained and would have to be refinished.

A compound of grease, pumice and fine sea sand or grease with coarse abrasives was tried and found to work well on some classes of work, the work first being cut down. This method eliminated the wet pumice but the work came from the wheel with a film of grease on the surface. In order to lacquer it, it was necessary to wash the work after brushing and in doing this numerous troubles were encountered. Unless great care was taken in the drying the work would rub together in the saw dust, spoiling the finish and necessitating rebrushing. Staining was still encountered and in some classes of work it was found very hard to remove all the sawdust after drying.

In order to simplify the above methods a greaseless compound in cake or brick form is now used by many concerns who do brush brass finishes on a large scale. The work in most cases is cut down to produce an even surface, washed absolutely free from grease and brushed on a Tampico or a brass wire wheel. In washing the work before brushing no great amount of care is necessary as long as all the grease has been removed, for if it is slightly scratched the marks will be removed in the brushing operation. The drying is done on a hot plate, eliminating the use of sawdust. Most concerns use a wheel 8 or 10 inches in diameter, running between 850 and 1,000 r. p. m. It is important that the speed of the wheel be not too great, for a high speed produces a shiny effect on the work. A light pressure of the work against the wheel is also necessary, for if too much pressure is used a wavy or irregular scratch will result. The work heating up from the friction will cause the compound to smudge or stick. It is therefore necessary that only a light pressure be used against the wheel. In using this method it is not necessary to wash the work after brushing for it comes from the wheel clean and ready to lacquer. Needless to say, in eliminating the final washing one of the most expensive operations is done away with and costs are cut considerably.

Dark Green Gold

Q. How can I get a particularly dark green gold finish?

A. Presuming that your green gold solution is prepared so that a good green color is produced, then the addition of small portions of lead cyanide added thereto will give you a very dark green gold.

Temperature plays an important part in the development of the dark green gold tones.

A normal solution of 80 deg. Fahr. will give dark tones. If the solution is used at 120 deg. Fahr. the dark tone will have more of dark olive green tone.

The following formula gives excellent results:

Water	1 gallon
Gold Chloride	½ oz.
Silver Chloride	1/13 "
Cyanide of Lead	1/13 "
Sodium Cyanide	5 ounces

Three to four volts; 14 or 18 karat green gold anodes should be used or platinum anodes.—C. H. PROCTOR.

Flatware Alloys

Q. What is the composition of Russian white metal and Brazilian silver?

A. Twenty-five years ago or more when fine silver was very high in price, there was brought out a new alloy termed Brazilian Silver. This alloy was used in manufacturing spoons, forks and other similar flat ware.

The new alloy was similar to the prevailing German silver alloys, but contained aluminum. The composition was roughly as follows:

Copper	70 parts
Nickel	23 "
Aluminum	7 "

Russian white metal was possibly a similar alloy. Both were white resembling silver to some extent, but of a bluish tone.

Such alloys cannot be used for plating purposes with constant uniform results, especially when they contain aluminum in their alloy.

You can deposit cadmium with silver or nickel with silver to reduce the cost of an entire silver plate, or cadmium can be deposited from an electroplating solution.—C. H. P.

Deoxidizing Aluminum

Robert J. Anderson, metallurgist of the Bureau of Mines, Pittsburgh, Pa., is examining methods suggested for the deoxidation of aluminum and its light alloys. The presence of aluminum oxide in the metal or in its alloys seems to lead to defects of various kinds, and the problem is under consideration for study with a view to obtaining, if possible, a commercial deoxidizer. Preliminary experiments have been made with the use of misch metal (ferrocerium), and with boron suboxide for the deoxidation of aluminum-copper alloys.

Present Business Conditions

An Analysis of the State of Business in a Speech Before the Annual Convention of the Associated Business Papers in New York, October 11, 1922

By LEWIS E. PIERSON, President of the Merchants' Association of New York, and Chairman of the Board of Directors of the Irving National Bank

Mr. Lewis E. Pierson, President of The Merchants' Association and Chairman of the Board of Directors of the Irving National Bank, delivered an address before the annual convention of the Associated Business Papers at the Hotel Astor, October 11, 1922.

Mr. Pierson discussed "United For Better Business." In part he said:

"For the first time since 1914, the present year has witnessed American business at work under conditions approximately normal. That is to say, this year has afforded the country a chance to proceed about its affairs without with the influence of the disturbing and unusual factors which governed events during the preceding seven years.

THE READJUSTMENT

"From the outbreak of the great war, until the armistice, industry flourished under the exotic stimulus of war orders and wages, prices and profits rose to meet an incessant demand for production. Following the armistice, industry was called upon to fill the shelves emptied by the war, and it was not until the latter part of 1920 that the swift decrease of orders and the increase of frozen credits served notice on the country that war conditions had ceased.

"The eighteen months ending last January was a period of readjustment. Inventories had to be written off, wages and prices had to be reduced and the year and statements of 1921, in many instances disclosed deficits and surplus adjustments, instead of the profits of the preceding years.

SEVEN YEARS OF WAR CONDITIONS

"Thus over a period of seven years, American business operated under conditions which were unhealthy because they were temporary and abnormal. The long period of expansion established false standards for labor and capital alike, and the abrupt transition to the depression of 1921 bred discontent and dissatisfaction among labor, and induced caution approaching timidity among industrial and financial leaders.

"Perhaps never in our history was the change from prosperity so sudden or so severe, and certainly it was never so well handled, thanks to the financial buffers which the country found available in its Federal Reserve System, and it is no small tribute to the essential soundness and resourcefulness of the Nation that American business has already rebounded from its difficulties and is proceeding to make headway on sane and hopeful lines.

THE REACTION

"Examination of the facts and figures now available for the present year shows this encouraging reaction. Turn to the reports of industrial earnings, to the volume of business done, to bank loans, to investment buying, to stock prices, in short, turn to whatever index of events you please and you will find that the present year has shown a distinct and encouraging improvement over the corresponding period of 1921.

NO BOOM IN PROSPECT

"Do not misunderstand these indications or these results as the precursors of a sudden revival of boom times. Do not imagine that because we have successfully weathered one storm that the need for caution and patience has passed.

"We know that our business progress has been sufficiently assured to withstand the recent crisis in fuel and transportation, but we should remember that half the world is still disrupted and torn by the effects of the war, and that there are many great and serious problems both national and international to be met and solved, before we can relax any of our present vigilance.

"The world that we knew before the war no longer exists.

"Russia, the granary of Europe, has passed for the present from the company of nations that must now send food where formerly they secured it.

"Austria has shrunk from an empire to a city with an empire's name.

"Germany, with the stupendous foreign debt on one side, and reckless printing presses on the other, has lost most of her foreign markets and with them her purchasing power.

"New and untried states, only partially prepared for national existence, have arisen throughout Europe to work out their political and economic destinies, while the older nations with traditions of leadership, wealth and power behind them must seek new and changing outlets for their national energies.

CAUTION IMPERATIVE

"When we stop to reflect that the Europe to which we exported our wheat and steel, our oil and copper, our raw materials and our manufactures in 1913 has made way for this impoverished Europe, when we consider that America has grown in productive capacity, and has set new and more exacting standards of living in the intervening period, it is apparent that we must still be watchful and clear visioned to keep our country on the road of ordered progress.

"One fact that should be constantly in our minds is that in coming back to our present measure of prosperity we have already accomplished more than any other Nation has done in this direction. Our factories are running, our merchants are busy, our people are employed. And if we can keep to our present pace, adhering unceasingly to the program that has brought us thus far, doing each day's task well, and keeping our feet firmly on the solid ground of progress through hard work, we need not fear for the future.

WORK THE ONLY PANACEA

"The air is full of ambitious proposals to lift the country to a plane of greater prosperity through panaceas which will solve the problems that surround us, but the man or the Nation that relies for a cure-all on anything but work, patience, and still more work, is headed for disappointment.

"To make that work more effective should be the common aim. We cannot legislate our business into a state of blissful prosperity, but we can, and should endeavor to improve, wherever possible, the machinery of business. In that endeavor the first object should be to stabilize our business processes.

"The nearer we can come to a situation where our industries will proceed on a settled and established level, and where the interrelation of the various factors of our national business will be thoroughly fixed and universally

understood, the better we shall be equipped to meet and deal with whatever new situations may arise.

FLUCTUATIONS INDICATE WEAKNESS

"Sudden bursts of good times followed by abrupt periods of depression are not calculated to increase the real prosperity of a Nation. They indicate that there is something wrong with the machinery of National business and argue a weakness in the Nation's economic structure which should be corrected.

"If we can so arrange our affairs that the chart of National business will show a more even line, if we can fill in the hollows, and make the peaks less abrupt, it will be possible to plan our progress more intelligently and execute our program more surely.

STABILITY ESSENTIAL

"The business man has come to realize that the more evenly business is conducted, the better it is for everyone. And the obstacles to that orderly progress spring from a common source. Cast back over the causes of depression, over-production, strikes, ill-advised legislation, reckless competition, and you will be led to the conclusion that most of our difficulties proceed from the failure of the country as a whole to secure a thorough understanding of our National problems or from the inability or unwillingness of various sections and classes of the body politic to work together for the common good.

REACTIONS OF PRIVILEGE

"The farmer, for instance, in seeking legislation which will give him higher prices for his wheat, is too apt to forget that this immediate advantage may react upon him in the higher prices which the industrial labor which eats his wheat, must have for the products of the factory.

"The labor which advances its rate for building construction pays higher rent for its own quarters.

"The railroad worker seeking an increase in wages, thinks only of the immediate gain, without pausing to consider that he is at the same time increasing the price of every commodity that he uses which the railroads transport.

"The manufacturer who feels that the problems of the raw material producer or the retailer are not his problems, is likely to find that he cannot be prosperous unless his customers are prosperous.

"The banker who is content to transact his affairs without interesting himself in the problems of labor and industry, finds that his own business dwindles with any decrease in the prosperity of the farmer, the manufacturer or the retailer.

MUST UNDERSTAND EACH OTHER

"Our greatest need, then, is better understanding of each other's difficulties, a better knowledge of the underlying economic laws which regulate all business, and a greater readiness to work for the general good as the surest means of promoting individual welfare.

"If we can reach a point where there is general agreement on our National problems, and where we can bring the full force of an intelligent public opinion to the solution of these problems, we can stabilize our National business.

MUST HAVE COMMON SENSE

"If we can secure a crystallized National thought which will not hunt for vague panaceas, for prosperity through legislation, for any of the artificial expedients which attempt to override the inexorable laws of economics, but instead will seek progress through intelligent effort and moderate but steady gain we can look confidently to the future of the Nation's business.

"In the creation of this National attitude, the business papers of the country have a great and inspiring opportunity for service. Reaching, as they do, the industries of the country they are in a position to influence business thought and to direct it into proper channels.

INFLUENCE OF THE TRADE PRESS

"Week after week, and month after month, they can preach the gospel of progress through common effort and common thought. They can bring the business man into touch with all the National problems which affect him profoundly though indirectly. They can supply him with the facts which will enable him to form correct conclusions not only on his own business but on the business of the country as a whole.

"Finally, they can throw their great influence toward the achievement of an industrial understanding which will do for industry what the Federal Reserve System has done for finance.

THE FEDERAL RESERVE SYSTEM

"Until the creation of the Federal Reserve System the country was torn from time to time by periods of depression brought on by unskillful and inadequate use of financial facilities. Though crops might be good and business fair, a sudden tightening of money could precipitate hard times by interrupting the ordinary processes of business.

"With the advent of the Reserve Banks, and the creation of a reservoir out of which money could flow to meet sudden emergencies, American business was freed from this danger and assured at all times of sufficient liquid funds to transact its operations.

"The Reserve System did not create new stores of gold or silver, it did not make money out of thin air, or change the fundamental laws of finance in a single particular. It simply perfected and improved the financial machinery.

INDUSTRIAL ORGANIZATION NEEDED

"In similar manner the Nation should strive to improve and perfect the mechanism of industry. There is no more excuse for over-buying or over-production than there was for money panics. Depression through over-production proceeds from lack of facilities for adapting production to the demands of the market. Depression through over-buying proceeds from lack of facilities for ascertaining the public wants and from fear of a sudden halt in supplies.

"The Department of Commerce, under Secretary Hoover has already attacked the problem of providing proper organization for bringing the manufacturer, the retailer and the public into closer touch. The effort thus begun should be encouraged and supported. It is not enough that statistics and estimates should be available: the business man must be trained to use them and to base his activities upon accurate knowledge of conditions rather than upon his own surmise of what those conditions are. Here is a field where the business papers can be of supreme usefulness to their readers, and to the Nation.

THE TASK OF THE FUTURE

"The growth and prosperity of the United States have been due in largest part to great natural resources in the keeping of a people who developed these resources with energy and intelligence. After the tremendous world changes that have taken place, those resources and those people remain. The immediate task before us is to direct the Nation's energies toward the solution of the newer problems that confront it, with sanity, with intelligence and with agreement upon the broad essentials which will enable us to work together for the common good of all."

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER, THE ELECTRO-PLATERS' REVIEW

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EDITORIAL

FOUNDRY COST KEEPING

In this issue we publish an article by W. L. Churchill entitled "A Little Knowledge Is a Dangerous Thing," which is an answer to the article on Standard Foundry Costs by Thos. Harper published in our October issue. Mr. Churchill, although agreeing with Mr. Harper on the fundamental principle that it is first necessary to know the costs in order to make correct charges, disagrees with Mr. Harper's method of figuring costs. The two important points of disagreement are:

(1) Whether foundries should base their charges mainly upon service rendered or upon the metal handled.

(2) Whether charges should be based upon the cost per piece, due to the infinite variety of castings, both size and shape, instead of the cost per pound.

It is needless to say that this disagreement is simply one of method and not of principle. The points, however, are extremely interesting and of vital importance to the foundry industry. It is common knowledge that castings have almost always been sold by the pound. In many cases blanket contracts have been made covering a period of time in which all castings would be made at the same price. The foundryman figured that he would get a rough average of good work and bad which, at the end of the year should show him a profit. In many cases this proved to be faulty figuring. In the first place it is practically impossible to price a casting before knowing what it is. In the second place an average price must necessarily be higher than the lowest price. This resulted in a temptation to the buyer of these castings to supply his regular foundrymen with the difficult pieces and small jobs at the average price, and to shop around elsewhere for lower prices on his production work. Needless to say, such a policy was ruinous to the foundryman.

It has also been common practice for foundries to charge a profit on the metal handled. It is generally accepted that this is legitimate. It is our impression that Mr. Churchill does not hold that this type of profit is unfair but that it is inexpedient; that it leads to difficulties under certain conditions. It cannot be denied that two foundries of the same size, and doing the same type of work should make the same profits. However, if one foundry is casting aluminum or high grade bronzes while the other is working in cheap mixtures, this method of costing would show a wide difference in the profits earned by these two foundries. How can one eliminate this difference?

Although as has been stated many times the important thing is not what system to use but to have a system that will work, nevertheless, it would be of immense value to the foundry industry to have a system which could be applied generally and would cover the variations to which the foundry industry is subject. Moreover, it must be of the sort that is applicable to small shops; it must not be cumbersome or over-involved, it must be simple and accurate enough to operate in plants varying from a few men to a large number. Is there such a system? We should be glad to have information from our readers on this subject. We want not only suggestions for improvement but also expressions of their difficulties. The airing of these troubles is likely to bring to light remedies which have been discovered elsewhere.

TECHNICAL CONTROL IN THE FOUNDRY

In a very interesting paper, E. H. Dix, Jr., of Dayton, Ohio, detailed before the Rochester meeting of the Institute of Metals, the way in which the foundry at McCook Field was controlled. Although it seems that in this day and age no excuses should be necessary for management of this sort, it is well known that a large proportion of foundrymen still sneer, privately if not publicly, at technical control of a business that was once entirely in the hands of "practical" men. It might be useful to outline the methods employed.

The control of the foundry is grouped under four heads: Temperature control, chemical analysis, physical testing, metallographic examination. The details of the work done under these four heads are, of course, too many to give in full in this space, and are, for that matter quite obvious to the experienced foundry manager. The important thing is the correlation of these four departments. Every lot of metal must be identified and kept track of by means of a melt number. The combined data sheets gives all the information about this melt, except the metallographic record, which is presumably filed along with it.

An excellent feature of Mr. Dix's recommendations was the fact that he recognized the need of co-operation between the technician in control of the foundry and the superintendent in direct charge. He states that "implicit faith in the pyrometer may lead to more rejected castings than the total absence of any temperature recording device. The pyrometer in the hands of a novice cannot take the place of an experienced melter, for even with the best of care pyrometers have a habit of getting out of order."

After all, the test of the worthiness of technical control is its return on money spent, as it is, at best, an expensive institution. The men must be of a high grade, and the equipment is often both high-priced and delicate. Nevertheless practically every foundry of any size has installed technical methods of controlling its operations and found it to pay. No one recommends an expensive scientific department for small foundries. Over-systematized companies are perhaps worse off than under-systematized concerns. But a healthy use of chemical analyses, metallographic analyses, pyrometers and physical tests will be found a good prescription for any foundry in operating difficulties.

THE SHEET COPPER SITUATION

In an address by W. A. Willis, Manager of the Copper and Brass Research Association, before the metal branch of the National Hardware Association, a number of important topics were covered. Mr. Willis explained the work of the Copper and Brass Research Association which should be familiar to the readers of THE METAL INDUSTRY. The Association, through public education and through technical and commercial research work seeks to increase the demand for copper, brass and bronze products generally. The Association is co-operative in character, being composed of most of the large copper mining, smelting and fabricating concerns.

It seemed that handlers of sheet copper were unable to obtain from the sale of this material more than one-third profit which they gained from the sale of other metals. Their commission, approximately 5 per cent., did not meet their business overhead. They put this problem up to the copper mills and it was finally brought back to the Association.

Under the rules of the Association, and for that matter under the laws regulating business in this country, this Association could not possibly dictate to producers, fabricators or jobbers what they should pay and charge. However, whatever legal action was possible was undertaken unofficially with the idea, of course, that progress in the copper market was impossible without co-operation between the various interests involved. Large sums are being spent in advertising by the Association and these sums would be completely wasted if friction developed.

According to Mr. Willis, the solution of this difficulty lies in increasing demand, which of course, the Association is essentially organized to foster. It has been stated that the results of the attempt, so far, are very encouraging, but how much due to the advertising and publicity campaign of the Association or to generally improved business conditions, it is hard to say.

More than a quarter of a million dollars have been spent during the past year by the Association. The outlook ahead is promising. The consumption of copper in 1922 building is estimated at 150,000,000 pounds which is an increase of 100,000,000 pounds over 1921, 96,000,000 pounds over 1920 and 73,000,000 over 1919. Encouraging as this increase seems to be, it is small compared to the theoretical market for copper and brass in the building industry which is stated to be 650,000,000 pounds.

It is our impression that Mr. Willis' conception of the best remedy for the dealers' difficulties is correct, namely that increased profits should come from increased volume of business. The future of copper depends to a large extent on its price. At the present time it is perhaps selling somewhat below its true industrial value, but on the other hand even in the past year or two when it was considerably lower, the prices charged to the ultimate consumers of copper and brass products were prohibitive. In order to regain its place, it must live down its record of being too expensive. A large legitimate market exists but the only way in which it can be fully gained is by large turnovers and reasonable margins of profit. For some time it may be necessary to be satisfied with even a little less than this reasonable margin, but this procedure should pay in the end.

Technical and Scientific Papers

Papers Read at the Forty-second General Meeting of the American Electro-chemical Society in Montreal, September 21-23, 1922

Principles of High Temperature Furnace Design, by E. L. Smalley

The best electric furnaces, judged from the view points of highest quality of products, lowest cost of operation and maintenance, and greatest safety in operation at high temperatures, must have these attributes: Muffled type where best suited to the process. Exposed element or radiant form only when best adapted to a process. Must have elements of sufficient number for cheap renewal. Elements must be readily and easily renewable. Coils must be fully supported, and yet free for expansion. Refractory parts must be thoroughly supported, but free for expansion. No internal connections of coils should be tolerated. Terminal sizes should be larger than the element size. Source of heat must be uniformly distributed. Size of furnace must be governed by the charge. Placement of elements should not control the furnace size. Thermal efficiency should be a controlling feature in decision. Transverse section of heating elements should be round. Exposed elements should preferably be in corrugated grooves. Elements should not be chosen to suit a voltage. Total weight of heating element should be high in proportion to the weight of the charge. Efficiency of heat insulation must be adapted to the work to be performed. All of these characteristics, when properly combined with one another, will make the furnace most successful.

The Development of Industrial Electric Heating for Low Temperature Enameling, by Wirt S. Scott

As a result of certain tests, the following facts were established:

1. With restricted ventilation, explosions were possible in enameling ovens, regardless of the temperature of the heating element.

2. A sufficient amount of air must be admitted to the oven to keep the mixture "lean," or sufficiently dilute to make an explosion impossible.

3. The vapors should be withdrawn at or as near the floor as possible.

The Effect of Impurities in Nickel Salts Used for Electrodeposition, by M. R. Thompson and C. T. Thomas

ABSTRACT

Experiments were conducted to determine the effect of the principal impurities present in nickel salts upon the character of the deposited nickel. It was found that of the impurities likely to be present copper and zinc are especially objectionable. Analyses were made of a considerable number of samples of commercial salts. Specifications for the purity of these materials are suggested.

CONCLUSION

It is believed that, if the above specifications are found to be consistent with the experience of those engaged in nickel deposition, there will be no serious difficulty in getting the co-operation of manufacturers in producing salts of the desired purity. In connection with the furnishing of samples of salts to be analyzed, several manufacturers have assured this Bureau of their willingness to assist in maintaining a high standard of purity for these materials. The authors wish to acknowledge the courtesy of numerous firms in furnishing samples and information regarding their products, and to express their appreciation for the assistance of Mr. J. H. Winkler in preparing the electrolytic deposits, and for suggestions and advice from Dr. William Blum, under whose direction this investigation was conducted. Valuable suggestions were also received from Mr. G. B. Hogaboom, electroplating adviser to the Bureau of Standards and from the Research Committee of the American Electroplaters' Society.

The Application of Contractometer to the Study of Nickel Deposition, by E. A. Vuilleumier

The mechanical stresses of nickel as deposited were studied by plating the nickel on one side of a thin sheet of platinum and measuring the bending or contraction.

The degree of contraction decreases when the deposit becomes more coarsely crystalline.

There are at times delays and spurts in the contraction, especially when little or no hydrogen is liberated during the deposition.

Hydrogen, when and while electrolytically deposited, causes the nickel to expand.

The contraction of the nickel is evidently a function of the size of the crystalline grains, etc., and the consequent amount of internal stress in the deposit. There are a number of factors influencing the structure of the deposit, such as metal ion concentration, hydrogen ion concentration, current density, temperature, etc.

The contractometer is discussed in connection with the peeling deposits, and other applications to electrodeposition.

Inclusions in Aluminum-Alloy Sand Castings. Technical Paper 290. By Robert J. Anderson, Metallurgist, U. S. Bureau of Mines.

In aluminum-alloy foundry parlance, metallic and non-metallic inclusions are termed "hard spots," and in aluminum-alloy sand castings and in die castings they are very troublesome. Although many representative aluminum-alloy founders by care in practice have been able practically to eliminate hard spots and resulting trouble when aluminum-alloy castings are machined, others still have periodic difficulties because of this defect. A number of foundry men have suggested at various times that the Bureau of Mines investigate hard spots, put the available information on record, and suggest preventive methods. Such an investigation was undertaken and carried out in connection with the bureau's work on casting losses in aluminum-alloy foundry practice. The present paper is published as a contribution to the literature of aluminum-foundry practice and as a guide to founders in preventing scrap losses from hard spots in castings. Technical paper 290 may be obtained by addressing the Bureau of Mines, Washington, D. C.

CORRESPONDENCE and DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

EMERY VS. ABRASIVE

To the Editor of THE METAL INDUSTRY:

In our monthly perusal of THE METAL INDUSTRY, we frequently find reference to the suggested use of emery, emery wheels, etc. It occurs to us it might be good editorial policy on your part to confine such references to more modern terms, as abrasives and grinding wheels. Even the term abrasive wheel is commonly understood to cover all classes of wheels, whether they are made of natural emery or artificial material.

We believe you will find the above being generally followed by most publications dealing with technical matters of this kind, and we give you the suggestion for what good you might get out of it.

PHILADELPHIA, Pa. ABRASIVE COMPANY.
October 19, 1922.

The word "emery" has come down through generations of use because it was practically the only abrasive material used. It is true, however, that in recent years important advances have been made in new abrasives, making "emery" no longer standard for abrasive.—Ed.

SUBSTITUTE FOR RED AND WHITE LEAD

To the Editor of THE METAL INDUSTRY:

I have read with very great interest the article on page 403 of the October issue of THE METAL INDUSTRY magazine, which article sets forth the desirability of eliminating the use of red lead and white lead in making plumbing joints.

This article is of considerable interest to me, and particularly so to a client of mine, who has invented a very clever device for sealing pipe joints, thereby eliminating the use of lead. This invention, I believe, is of paramount importance to the plumbing industry and may likely be of considerable interest to plumbing manufacturers because of the fact that it is quite inexpensive to manufacture and is positively effective in sealing all manner of pipe and fitting screw-thread joints and connections.

As a matter of information, I am dropping you this line to ask whether or not the readers of THE METAL INDUSTRY would likely be interested in this invention, or are there already on hand some substitutes for white and red lead?

NEW YORK, JAMES C. LEDBETTER.
October 19, 1922.

SHOP PROBLEM SOLVED

To the Editor of THE METAL INDUSTRY:

We are in receipt of your answer to our problem which we sent to you on May 19th, and desire to thank you for same. The alloy mentioned is a new one on us for that purpose, but it sure is a dandy. We had lost faith in the questions and answers columns of the trade papers, having had some amusing experiences with same, but you have restored our faith and we congratulate you on having at your command one who is more than a "penny a line."

With best wishes,

SUBSCRIBER.

ALUMINUM SILICON ALLOYS

To the Editor of THE METAL INDUSTRY:

In your Journal, THE METAL INDUSTRY of May, 1922, appears the article, "New Aluminum-Silicon Alloys," by R. E. Search. I allow myself to note the following. "Silumin is identical with the American invention of Dr. Pacz. The sale of the alloy in Germany is handled through the Metallbank und Metallurgische Gesellschaft-Akt-Ges. Frankfurt a/Main, who, with others had acquired the German Pacz patent."

The investigations arranged for the alloy, likewise took place in the laboratory of this firm. The allusion to the invention originated by Dr. Pacz, who also deserves it, belongs alone to him who had discovered it.

I am extremely sorry that this portion of my work has given occasion to a misunderstanding. Permit me herewith to rectify the error.

J. CZOCHRALSKI,
Per G. WELTEY.

Frankfurt a/Main, Germany, August 22, 1922.

To Mr. Czochralski:

If you will read, carefully, the article about Silumin in the May number of THE METAL INDUSTRY, you will find that special pains was taken to point out that both yourself and the Metallbank und Metallurgische Gesellschaft-Akt.-Ges., Frankfurt a/Main, deserved great credit for investigating the properties of the new alloy and making them known, but what seemed to the writer a strange oversight was the fact that you failed to mention the name of Dr. Pacz, the inventor of the alloy.

No record of a German patent could be found of a German patent awarded to Dr. Pacz, or to anybody else on the new alloy.

The impression conveyed to the reader of your article, perhaps inadvertently was, that the Metallbank und Metallurgische Gesellschaft-Akt.-Ges., Frankfurt a/Main, had taken out a patent on the new alloy in Germany, which of course was not true. We have learned elsewhere, since the publication of the article in THE METAL INDUSTRY, that the company had acquired the sole right of manufacture and sale of the new alloy in Germany.

The writer greatly admires the investigational work that you have been doing for some time on the non-ferrous alloys and he hopes that you will continue in the future the success that you have already attained. R E. SEARCH.

Washington, D. C., September 20, 1922.

New Books

Hand Book for Electrotypers, by J. F. Locke. Size 5 x 7, 35 pages, paper covered. Price, payable in advance, $1.00. For sale by The Metal Industry.

The purpose of this booklet as stated by the author is to place before electrotypers some of the fundamentals of chemistry and electricity as they apply practically to the electrotyping industry. The subject matter given therein was the basis of the series of lectures given before the Electrotypers of Cincinnati, Ohio. Subjects covered are substances and elements; combining weights; symbols and formulae; equations; neutralization; ionization; method of expressing temperatures; method of expressing specific gravity; electrical terms; Ohm's law; series and parallel; electro deposition of metals; chemical and electro-chemical equivalents; acid copper sulphate solution; nickel electrotyping and electrotyping wax.

The Journal of the Institute of Metals, Volume XXVII, edited by G. Shaw Scott, Secretary. Published by the Institute of Metals, 36 Victoria Street, London, England.

This is the first of the 1922 volumes covering the transactions of the proceedings of the annual general meeting, papers delivered at that meeting and abstracts of papers relating to the non-ferrous metals and the industries connected therewith. Table of contents includes the following papers, all of which have been abstracted or published in full in past issues of The Metal Industry:

Discussion on "Notes on the Corrosion and Protection of Condenser Tubes," by G. D. Bengough.

"The Internal Mechanism of Cold-Work and Recrystallization in Cupro-Nickel," by Frank Adcock.

"The Effect of Impurities on Recrystallization and Grain-Growth," by the Research Staff of the General Electric Company, Ltd., London.

"Further Studies in Season-Cracking and Its Prevention: Condenser Tubes," by H. Moore and S. Beckinsale.

"The Rate of Combination of Copper and Phosphorus at Various Temperatures," by Prof. C. A. Edwards and A. J. Murphy.

Note on "Some Cases of Failure in 'Aluminum' Alloys," by W. Rosenhain.

"Some Mechanical Properties of the Nickel-Silvers," by Prof. F. C. Thompson and Edwin Whitehead.

"A Further Study of the Alloys of Aluminum and Zinc," by D. Hanson and Marie L. V. Gayler.

Note on "The Assay of Gold Bullion," by Arthur Westwood.

"The Mechanism of Recrystallization in Amorphous Metal," by the late Prof. A. K. Huntington.

Publicity Methods for Engineers, published by the American Association of Engineers, 63 East Adams Street, Chicago.

This book includes the papers presented at the First National Conference on Public Information held under the auspices of the American Association of Engineers. Its purpose is to make plain the principles of presenting to the public information about engineers and to show by cases how this is being accomplished. The subject is one which interests deeply all practicing engineers and about which there is very little practical information to be had. One of the greatest needs at the present time is to acquaint the public (which includes both lay and business public) with engineering work. It is a difficult thing for engineers to present their case without going against the ethics of the profession. Nevertheless, it is being more and more clearly realized that publicity is necessary, in fact indispensable. This book is not the last word on the subject but should be of some assistance to those confronted with these problems.

Traité de Metallurgie générale, by Leon Guillet, professor at the Central School and at the Conservatory of Arts and Trades. One octavo volume of 541 pages, with 335 figures (Encyclopedia of Mining and Metallurgy Part of the Grand Industrial Encyclopedia). Stitched paper binding, 40 francs; flexible binding, 50 francs; published at the Librarie J-B Bailliere, 19, rue Hautefeuille, Paris.

The work embraces general metallurgical operations, their classification, methods of extraction of a metal from its minerals. General progress of metallurgy. Defines a mineral. Describes the preliminary metallurgical operations; roasting and calcination. All types of apparatus used and why. Methods of heating and conservation of the heat. Fusions and fusion reactions. Relations between the fusion operations and the laws of physical chemistry. Liquation and eliquation. Reducing and oxidizing fusions. Ebullition and the apparatus used. Electrometallurgy, electro-thermic phenomena and reactions. The electric furnace is discussed and reviewed extensively. Electrolysis and electro-thermic operations. Amalgamations. The pouring and casting of metallurgical products. Slags, scoria, their functions, operations and reactions. Use of powders, gases and apparatus for the purification of gases.

The work is invaluable from various points of view; as a text book to study with a view of absorbing its ideas and principles it is worthy of a high regard in a University curriculum; unfortunately there is no work of its general scope and character published in the English language that will at all compare with it. All American books on metallurgy specialize on one or two subjects and imply such a vast comprehension of the general subject that no one but a trained metallurgist can read them or refer to them with any degree of satisfaction.—R. E. Search.

A. S. T. M. Tentative Standards for 1922, published by the American Society for Testing Materials. Size 6 x 9, 774 pages. Price, payable in advance, $7.00 in paper and $8.00 in cloth binding. For sale by THE METAL INDUSTRY.

This is the 1922 edition of the tentative standards which are issued annually. By the term "tentative standard" is meant a proposed standard which is printed every one or more years with a view of calling forth criticism of which the committee is to take cognizance before recommending the final action toward the adoption of such tentative standards or formal action of the society. The standards of the American Society for Testing Materials are recognized as authoritative in the field of engineering materials. Sections of particular interest to those engaged in metals are the following items:

B 17-21 T.	Non-ferrous Alloys for Railway Equipment in Ingots, Castings and Finished Car and Tender Bearings.
B 23-18 T.	White Metal Bearing Alloys (known commercially as "Babbit Metal").
B 24-22 T.	Aluminum Ingots for Remelting and for Rolling.
B 25-19 T.	Aluminum Sheet.
B 37-20 T.	Aluminum for Use in the Manufacture of Iron and Steel.
B 29-22 T.	For Pig Lead.
B 42-22 T.	Copper Pipe, Standard Sizes.
B 43-22 T.	Brass Pipe, Standard Sizes.
B 44-22 T.	Seamless Admiralty Condenser Tubes and Ferrule Stock.
B 40-21 T.	Chemical Analysis of Aluminum and Light Aluminum Alloys.
B 41-21 T.	Chemical Analysis of Nickel.
B 45-22 T.	Chemical Analysis of Brass Ingots and Sand Castings.
B 46-22 T.	Chemical Analysis of Bronze Bearing Metal.

GOVERNMENT PUBLICATIONS

Platinum and Allied Metals in 1921, by James M. Hill, U. S. Geological Survey, Washington, D. C.

Arsenic, Bismuth, Selenium and Tellurium in 1921, by Victor C. Heikes, U. S. Geological Survey, Washington, D. C.

Secondary Metals in 1921, by J. P. Dunlop, U. S. Geological Survey, Washington, D. C.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical; WILLIAM J. REARDON, Foundry; PETER W. BLAIR, Mechanical; LOUIS J. KROM, Rolling Mill; CHARLES H. PROCTOR, Plating-Chemical; R. E. SEARCH, Exchange-Research }

BARREL PLATING

Q.—Kindly send us a formula for a good barrel plating solution for the following:

Nickel Plating
Cyanide Copper Plating
Brass Plating

In each one of the above we wish to plate a variety of small steel and iron goods.

A.—We suggest the following formulas for mechanical barrel plating in nickel, copper and brass.

Nickel formula.

Water	1 gallon	
Double Nickel Salts	8 ozs.	Temp. Normal
Single Nickel Salts	2 "	Voltage 6 to 8
Boracic Acid	3 "	
Sal Ammoniac	2 "	
Muriatic Acid	⅛ to ¼ ounce	

Copper formula.

Water	1 gallon	
Sodium Cyanide	7½ ozs.	
Copper Cyanide	6 ozs.	Temp. Normal
Bisulphite of Soda	2 ozs.	Voltage 6 to 8
Soda Ash	1 oz.	
Caustic Soda	1 oz.	
Hyposulphite of Soda	1/32 oz.	

Brass solution.

Water	1 gallon	
Sodium Cyanide	8 ozs.	
Copper Cyanide	4 "	Temp. Normal
Zinc Cyanide	2 "	Voltage 6 to 8
Soda Ash	2 "	
Caustic Soda	1 oz.	
Sal Ammoniac	1 "	

The solutions should be replenished from concentrated stock solutions.

The nickel solution with single nickel salts, boracic acid, sal ammoniac, and occasionally a little free muriatic acid. Try the following proportions to be increased as may be required:

Water	?
Single Nickel Salts	1 pound
Boracic Acid	2 ozs.
Sal Ammoniac	2 "
Muriatic Acid	14 "

Copper and brass solutions upon the original formula basis.

Solutions may require only sodium cyanide at intervals instead of the metals.

As a brightener for brass deposits arsenic is the best factor. The following proportions will be ample for 500 gallons of solution, so use discretion in its addition:

Water	1 pint (warm)
Caustic Soda	4 ozs.
White Arsenic Powder	1 oz.

C. H. P. Problem 3,135.

CLEANING HANDS OF LACQUER

Q.—How can I get lacquer off my hands?

A.—The cheapest method would be to use wood alcohol. This material dissolves gums and cellulose from which lacquers are principally made.

Acetone can be used, as well as trichlorethane. The latter articles, however, are more expensive than wood alcohol.

After cleansing in wood alcohol, wash the hands in a mild hot tri-sodium phosphate solution, about four ounces per gallon of water. You will find that your hands will be thoroughly cleansed from the lacquer that gets into the pores of the skin from lacquering operations.—C. H. P. Problem 3,136.

HARDNESS TESTS

Q.—I am enclosing herewith two samples of brass used in making screws, and would appreciate a comparison of these two samples.

You will note that a tensile test has been taken, the better one breaking under a beam load of 2,200 lbs. (about 65,000 lbs. per sq. in.) the other breaking at 1,810 lbs. (about 53,000 lbs. per sq. in.) In the cold heading operation the poor one is entirely unsatisfactory as you will note from enclosed samples. The analysis as given to me is as follows:

	No. 1 O. K.	No. 2 Unsatisfactory
Copper	72.02	71.00
Zinc	27.94	28.92
Iron	.03	.04
Tin	Trace	Trace
Lead	None	None

Analysis of other brasses, which were O. K. in the heading operation were as follows:

Copper	72.43	72.74	72.00	71.41
Zinc	27.51	27.20	27.90	28.59
Iron	.05	.02	Trace	Trace
Tin	None	Trace	None	None
Lead	Trace	None	None	Trace

Analysis of two unsatisfactory ones follow:

Copper	71.10	71.61
Zinc	28.80	28.38
Iron	.06	.02
Tin	None	None
Lead	None	Trace

The composition apparently has no bearing on the physical properties. Would very much appreciate any information you might give me.

A.—There was no distinguishing mark on the two samples of brass, so we made a Brinell hardness test and have called one sample No. 1 and the other sample No. 2.

We find a Brinell hardness of 93 on sample No. 1, and a Brinell hardness of 130 on sample No. 2. This means quite a difference in the hardness of these two samples, and this may be the cause of the trouble you are experiencing.

As the analyses of the metal are practically the same, it would appear that the trouble is in the working of the metal while extruding, or drawing, and we would suggest a hardness test in the metal that is satisfactory. We are quite sure that you will be able to determine from the hardness test the material that is most satisfactory. They should then specify on future orders the hardness desired.

We are unable to tell from the samples submitted which one is satisfactory, so we are returning both samples after marking them No. 1 and No. 2, the hardness being 93 and 130, respectively, as stated above.

It has been our experience that the composition of an alloy after it has once been agreed upon can be checked very closely by the Brinell hardness test.—W. J. R. Problem 3,137.

LEAD CYANIDE

Q.—How can I make cyanide of lead?

A.—Cyanide of lead can be prepared in the following manner: Obtain some dry carbonate of lead in powder form. Make a strong solution of sodium cyanide, say 4 ounces per quart of hot water. To this add slowly and with constant stirring all the lead the solution will absorb.

Add the cyanide of lead so prepared in small portions to your dark green gold solution as required. Avoid an excess.—C. H. P. Problem 3,138.

NICKEL ON DIE CASTINGS

Q.—At present we are starting the nickeling of die castings and are having considerable trouble in making the nickel adhere to the metal and also keeping it from peeling. We are using our regular nickel bath for steel or drop forgings and putting in salt to soften the nickel and ammonia to neutralize the acid.

Our nickel bath was originally made with double nickel salts, to which a small amount of acid has been added. We are now trying to use this in a rotary plating tank in which the work rotates between two sets of anodes. This tank is similar to a Richards Rotary Plating Tank. We have strengthened this solution until it reads 13 to 14 Beaume. The trouble seems to be to get an even deposit and to prevent peeling. It seems impossible to get a deposit without being more or less burned at the ends. We are also having trouble with what seems to be small parts of the metal or casting coming out.

A.—Evidently you have not obtained full practical data covering nickel solutions for die castings and steel articles, otherwise you would have been informed that while it is possible to plate die-castings in a nickel solution prepared for steel, there is always a great danger of pealing and non-adherence of the deposit.

Even your nickel solution prepared for steel is not as effective as it might be. Such a solution should be prepared as follows:

Water	1 gallon
Double Nickel Salts	8 ozs.
Single Nickel Salts	2 "
Boracic Acid	3 "
Sal Ammoniac	1 oz.
Muriatic Acid	1/16 "

This solution will give a rapid white nickel deposit. If the current is properly controlled burning can be avoided.

You might try plating the die castings in this solution. A light copper deposit from a copper cyanide solution will prove an advantage upon the die casting before nickel plating. If, however, you continue to meet with trouble, then a nickel solution especially adapted for die-castings should be used.

The following solution will give the desired results:

Water	1 gallon
Double Nickel Salts	8 ozs.
Common Salt	3 "
Sodium Citrate	3 "
Citric Acid	⅛ oz.

Care must be used, however, in cleaning the die-casting. Only mild cleaners should be used.

Solutions strong in caustic soda have a darkening effect upon die-castings, which frequently causes peeling.—C. H. P. Problem 3,139.

REMOVING ZINC

Q.—What is the best way to get the zinc out of scrap aluminum?

A.—If the zinc is to be eliminated for foundry making castings, we would suggest using a small amount of the aluminum alloyed with zinc to each charge and flux with chloride of zinc or sal ammoniac skimmings. Just before pouring stir well and skim the metal well, and add a small piece of rosin.—W. J. R. Problem 3,140.

SEPARATING NICKEL FROM IRON

Q.—We have on hand about a ton of discarded iron wire plating baskets which have a nickel deposit of from 60 per cent to 75 per cent nickel. How can we separate the nickel from the iron?

A.—The attempt to save the nickel from a plated iron wire basket would be almost hopeless. If the baskets were made of brass the nickel could be saved by using the basket as an anode and make the electrolyte of a 50-50 solution of hydrochloric acid.

It would not do any harm to try this electrolytic method on the iron wire baskets, but I fear the results would not pay.—R. E. S. Problem 3,141.

SOLDERS

Q.—We are manufacturing fuse plugs and have trouble in soldering the fuse wire to the brass contact. We use 50-50 solder and pure zinc fuse wire. What is a good soldering agent?

A.—The fluxes generally used are rosin and chloride of zinc for soft soldering. The flux is added first and the solder melted by means of a flame or soldering iron. The latter should first be smoothed with a file and then properly tinned.

Fine solder is largely used for soldering britannia ware, brass and tin plate articles. The soft solder called common solder is largely used for ordinary work by plumbers. This solder contains two parts lead and one tin. The soft solders are termed "common," "medium," and "fine," according to the tin content, those containing the most lead being the cheapest and of the highest melting temperatures.

There must be some foreign substance in your solder, as you are experiencing this difficulty, or your pieces are not clean, because any of the regular flux products can be used. As the best soft solders are made from pure lead and tin, antimony is an objectionable impurity as it renders the solder less fluid when melted and tends to prevent adhesion of the surface. Zinc also has an injurious effect on soft solder causing it to flow sluggishly. Aluminum acts in a similar way.

A small percentage of phosphorus renders soft solder very lively, that is the solder has a tendency to run freely. Too much phosphorus is injurious and if added to thin the solder it should be in the form of phosphor tin. One or two ounces of five per cent. phosphor tin to one hundred pounds of solder is sufficient.—P. W. P. Problem 3,142.

SPOTTED TIN

Q.—Will you please advise us what causes small white spots appearing on a hand dipped tinned article, after it has gone through the grease? We take it that there might be something that we could add to the grease that would eliminate these spots. We do not seem to be able to get any cleaner that will remove same.

A.—We should infer that there are some impurities in your tin, which cause the white spots referred to. Zinc would develop such spots.

It is hardly possible that the spots are caused by the grease flux. We presume you use tallow. You might try palm oil in the place of the tallow or a mixture of both.

There was a patent granted for a special tin flux several years ago, which was claimed would eliminate black spots and cloudiness. Your trouble comes under the latter designation.

The formula is as follows:

Petrolatum	4 parts
Stearic Acid	2 "
Castor Oil	1 "

You might also try the addition of 2 to 4 ounces of carbonate of ammonia per gallon of hot water. It is possible that this ammonia salt may overcome the white spots.—C. H. P. Problem 3,143.

STRIPPING NICKEL

Q.—How can I strip a nickel plate with electric current?

A.—Prepare the electro-strip upon the basis of:

Sulphuric acid	75 ounces
Water	25 "

Use as much of the acid and the water as may be required for the strip.

The articles become the anodes (positive current).

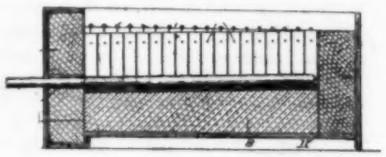
As cathodes (negative current) nickel or copper may be used.

The voltage should be six for rapid results, using a strong current in amperes. A one and one-half hour nickel deposit can be stripped from a surface in 5 to 10 minutes, leaving a clean semi-bright surface on the basic metal, stripped of its nickel deposit.—C. H. P. Problem 3,144.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,418,984. June 6, 1922. **Electric Furnace.** Frederick W. Sperr, Jr., and Harold J. Rose, of Pittsburgh, Pennsylvania, assignors to the Koppers Company, of Pittsburgh, Pennsylvania, a corporation of Pennsylvania.



The present invention relates to furnaces, and more particularly to electric furnaces for testing materials. The present invention is illustrated as embodied in an electric furnace for heating coal samples.

The object of the invention is to produce a furnace of this character in which the heating can be accurately and readily controlled. The furnace is so constructed that when used for heating a tube containing a coal sample, the sample may be heated progressively in such a way as to closely simulate the coking conditions of a byproduct coke oven.

1,421,205. June 27, 1922. **Work Holding and Feeding Device for Grinding or Polishing Machines.** Rufus W. Fuller, Deerfield, Mass., assignor to Production Machine Co., Greenfield, Mass., a corporation of Massachusetts.

The invention relates to machines for grinding or polishing articles of cylindrical form, and more particularly to work holding and feeding devices for such machines.

1,420,980. June 27, 1922. **Process of Manufacturing Electrical Resistance Material.** Ferdinand Eichenberger, Aarau, Switzerland, assignor to the firm S. A. Kummler & Matter, Aarau, Switzerland.

The invention relates to a new and improved process of manufacturing electrical resistance material which stands low, intermediate and high temperatures.

The novel process consists in that silicon carbide is used as a base to which calcium carbonate, oxides of metals and graphite are mixed to vary the coefficient of resistance.

1,420,903. June 27, 1922. **Metal Mold.** Clair J. Amick, Cleveland, Ohio, assignor by Mesne Assignments to Aluminum Manufactures, Inc., Cleveland, Ohio, a corporation of Delaware.

This invention relates to permanent molds for making hollow castings with inwardly extending projections, especially pistons for internal combustion engines. One object of the invention is to provide a core for casting internal combustion engine pistons having a relatively small clearance between the inner ends of the wrist pin bosses.

1,420,888. June 27, 1922. **Method of Coating Molds.** Arteemes D. Straw, Wauseon, Ohio, assignor by Mesne Assignments to The Herbert A. Myers Co., Toledo, Ohio, a corporation of Ohio.

The invention relates to the metal casting art and is directed to the treatment of molds with the oxides of metals having low oxidizing temperatures to produce deposits of the oxides upon the surfaces of the mold so that pitting of the mold and casting is prevented and the metal, while cooling from the liquid to the solid state, is permitted to conform closely to the shape of the mold, whereby smooth, perfectly formed castings are produced.

1,421,954. July 4, 1922. **Molding Composition.** John L. Keller, Charleston, W. Va.

This composition consists of the following ingredients, combined in the proportions stated, viz:

Water, 17½ per cent; paper, 35 per cent; saw dust, 20 per cent; cement, 10 per cent; lamp black, 4 per cent; paris green, 4 per cent; linseed oil, 3 per cent; wheat flour, 2½ per cent; brick dust, 4 per cent.

1,422,019. **Alloy of Refractory Metals and Process of Forming Same.** John Adam Yunck, South Orange, N. J.

This invention relates to an alloy of tungsten and thorium particularly useful in making metal filaments and incandescent lamps, and a method of making same. Various alloys of the refractory metals have been proposed for this purpose because the alloys are usually more ductile than their constituents taken separately, but none of such alloys heretofore proposed have been successful for the purpose because they either had too low a fusing point, or volatilized at high temperatures and discolored the lamp bulb.

1,421,686. July 4, 1922. **Zinc Alloy.** Hans Goldschmidt and Karl Muller, Essen, Germany, assignors by Mesne Assignments, to the Chemical Foundation, Inc., a corporation of Delaware.

This invention refers to an alloy of zinc containing manganese in certain limits.

An alloy consisting predominantly of zinc and from about 0.5 to 4% manganese.

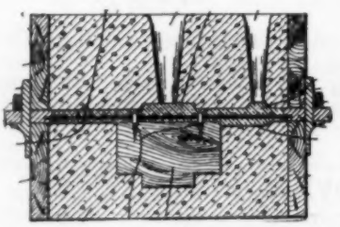
An alloy consisting predominantly of zinc and from about 0.5 to 4% manganese and from about .25 to 2% aluminum.

1,421,471. July 4, 1922. **Metal Compound Powder and Process for the Production of the Same.** Walter Prosser Heskett, Castlecliff, New Zealand.

The object of this invention is to produce from metal compounds a fine powder of the whole metals, as distinct from the powders formed by the oxides, sulphides or chlorides of metals now produced for various commercial purposes, which wholly metallic powder forms a new article of manufacture that may be used for a large variety of purposes in the arts or sciences.

1,418,703. June 6, 1922. **Molder's Match Plate.** John J. Evans, of Tacoma, Wash.

This invention relates to improvements in match-plates for molding metal castings and in the method of making the same.



The object of the invention is the provision of a match-plate frame of simple construction whereon a pattern of plastic material, or partially of plastic material and partially making use of the original wood pattern, may be formed or secured with beneficial results in the production of castings, and particularly in the molding of articles wherein an even joint is required to be made between the upper and lower parts of the mold-flask.

15,407. Reissued July 11, 1922. **Aluminum Alloy.** Francis C. Frary, Oakmont, Pa., assignor to Aluminum Co. of America, Pittsburgh, Pa., a corporation of Pennsylvania.

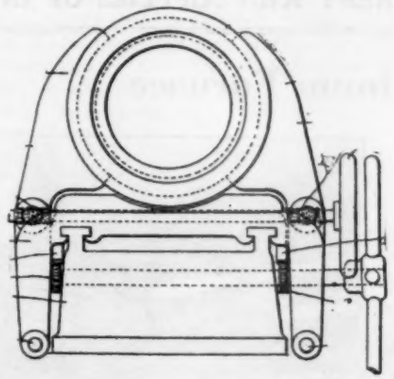
This invention relates to aluminum alloys. It was found that alkaline-earth metals, when added in suitable proportions to aluminum alloys, and particularly to those comprising aluminum, copper and magnesium and including or not manganese or a metal having similar action in alloys, impart to such alloys valuable qualities or properties.

1,422,707. July 11, 1922. **Polishing Compound for Finishing Table Cutlery.** Gustav F. Hemming, New Haven, Conn.; Theresa L. Hemming, Administratrix of said Gustav F. Hemming, Deceased.

A polishing compound for use in a tumbling barrel consisting of the waste products resulting from 1st, the glazing of the steel cutlery with fine emery, beeswax, and tallow; and 2nd, the cleansing of the cutlery in a distillate.

1,418,826. June 6, 1922. **Rotary Casting Machine Mold.** William A. Outerbridge, of Coventy, England.

This invention relates to rotary casting machine molds of the kind in which the mold-parts separate in the direction of their axis, and especially that kind of machine mold in which the metal is pressed when molten into shape by centrifugal force due to the rapid rotation of the mold. Such a machine forms the subject of the specifications of a British Patent, No. 118,304 and of a United States Patent, No. 1,325,039, both granted to William Arthur Outerbridge. According to those specifications the separating mold parts are held together by pressure applied axially to hold a front-plate carried by ball-bearings and a mold proper, carried by a sleeve, in frictional contact each with the other. In other machines of the rotary type the front-plate has hitherto been bolted or hinged to the mold by which alone it was carried.



1,422,591. July 11, 1922. **Alloys of Aluminum and Process of Producing the Same.** Anton Manhart, Vienna, Austria.

Alloys of the best qualities have been obtained by using the following proportions:

Copper, 2.500; manganese-copper, 1.250; tin, 6.000; antimony, 0.1652; magnesium, 0.0375; potash, 0.0375; sulphur, 0.0125; aluminum, 10.000.

1,422,200. July 11, 1922. **Grinding Wheel.** Harry E. Harris, Bridgeport, Conn.

This invention relates to an improved grinding wheel and has for its object to provide such a wheel having a large mass and moment of inertia so that it will rotate accurately on its axis. Another object is to provide a grinding wheel composed of a wheel of steel or other metal carrying a disc or ring of abrasive material on its periphery.

1,422,974. July 18, 1922. **Art and Mechanism for Drawing Hollow Cylindrical Metal Bodies.** Clifford B. Higgins, Detroit, Mich., assignor of one-half to Harry A. Higgins, Detroit, Mich.

This invention relates to the art of drawing hollow cylindrical metal bodes, commonly referred to as tubes or shells, for the sake of convenience hereinafter referred to as tubes, over a triblet or mandrel and particularly to the removal of the drawn cylinder from the mandrel. It is desired, however, not to limit this process to what are commonly known in the trade as tubes.

1,423,338. July 18, 1922. **Alloy and the Method of Producing Same.** Clemens A. Laise, Weehawken, N. J., assignor by Mesne Assignments, to General Electric Co., Schenectady, N. Y., a corporation of New York.

This invention relates to a new and useful alloy and to the method of producing the same. It relates more particularly to the production of an alloy that shall possess desirable properties which make it especially suitable for uses as electrical contacts, magneto points, targets and sheet metal for wireless equipment, and wire for heating and lighting elements. It includes gold, tungsten, calcium vanadate and thorium oxide.

1,423,128. July 18, 1922. **Sand-Blast Apparatus.** Hugo F. Liedtke, Hagerstown, Md., assignor to Panghorn Corp., Hagerstown, Md., a corporation of Md.

This invention relates to sand-blast apparatus for cleaning castings or like purposes, of the type in which a sand-blast nozzle is movably mounted in a chamber or cabinet into which the castings or articles to be treated by the sand blast are transported by a movable carrier which also effects their delivery from the sand-blast chamber.

1,423,022. July 18, 1922. **Oil Burner.** Austin A. Riley, Indianapolis, Ind., assignor of two-thirds to Central States Bridge Co., Indianapolis, Ind., a corporation of Indiana.

The object of this invention is to provide an oil burner in which air to effect complete combustion is provided in quantities regulated to suit the supply of oil, and in a manner to thoroughly nebulize the oil in a chamber provided within the nozzle, before discharge for ignition.

1,423,815. July 25, 1922. **Electroplating Process.** Nelson V. Park, Niles, Mich.

This invention has reference to improvements in electroplating by aqueous bath having for an object, the provision of a novel process for effecting the rapid decomposition of the plating metal and its transfer to the receiving body without losses of the same and without the addition of metals in chemical form with the electrolyte.

1,423,922. July 25, 1922. **Process for the Manufacture of Brass.** Paul Dutoit, Lausanne, Switzerland, assignor of one-third to Alexis Boever, Lausanne, Switzerland.

The present invention relates to a process for the manufacture and purifying of brass beginning with its elements (zinc and copper), or its waste such as for example the scum, the ashes, the slag.

In carrying out this process introduce the metal to be melted into a bath of molten salt, the temperature of which is higher than the fusion temperature of the brass, and which does not react with the zinc or the copper. The brass gathers in a melted state at the bottom of the bath whereas the impurities float on the surface of the latter.

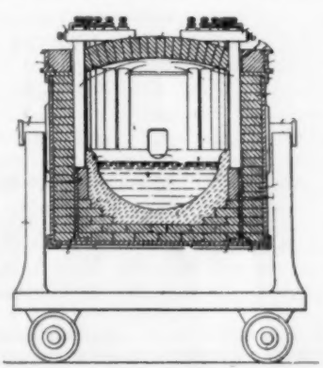
1,423,686. July 25, 1922. **Electrotinning.** Louis Schulte, Chicago, Ill.

This invention relates to improvements in electro-tinning, and more particularly to a solution and a method whereby electro-tinning can be successfuly carried out on a commercial scale and in an economical manner. The invention also includes a new article made by the new process.

1,423,654. July 25, 1922. **Casting Process.** Godfrey Engel, Sr., Brooklyn, N. Y., assignor to Buffalo Foundry & Machine Co., Buffalo, N. Y., a corporation of New York.

This invention has for its purpose to enable economical and practical casting of objects with inner and outer surfaces of different characteristics, particularly the production of kettles such as are used in certain chemical and industrial operations, where the inner surface, for instance, should be of acid resisting character and where the outer portion of the vessel need not possess this characteristic, but should possess great strength.

15,378. Reissued June 6, 1922. **Electric Furnace.** Harold G. Weidenthal, of Cleveland, Ohio, assignor, By Mesne Assignments, to Westinghouse Electric & Manufacturing Company, a Corporation of Pennsylvania.



This invention relates to electric furnaces and resistance elements therefor, and has for its object the provision of a new, improved, and simplified type of furnace; the provision of an electric furnace particularly adapted for manufacture in small sizes as required by brass and bronze founders, aluminum founders, and the like, although of great value in larger sized installations; the provision of a furnace wherein the largest possible amount of the heat generated shall be usefully employed; the provision of a furnace so constructed as to permit the easy replacement of resistance elements if and when required; the provision of a furnace equally applicable to direct or alternating current systems; the provision of a cheap, efficient and long-lived resistance element which shall be capable of withstanding high temperatures and oxidizing atmospheres.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

Schwartz Aluminum Furnace

The Schwartz furnace for melting aluminum is a cylindrical furnace, about 10 ft. long and 5 ft. in diameter; laid up with one course of insulating brick, the hearth and roof of which are made up of a good grade of fire brick. One concern at first used a carborundum hearth made of carborundum brick, but found there was a reaction upon this from the aluminum which caused hard spots. But they have had no trouble, whatsoever, with the common fire brick.

This furnace will hold 3,000 lbs. of molten metal which can be skimmed off through two slag doors on the side. They bring this metal up to a temperature of 1,200° and tap same into a receiving furnace, where it is brought up to a little higher temperature for crank case work. They have been able to melt 30,000 lbs. of metal in 10 hours with this furnace; the receiving furnace allowing them to recharge immediately, which increases the amount of metal melted per hour.

A test of this furnace is shown below, run for metal losses and also one for oil consumption. There is a great increase of metal melted per gallon of oil in the Schwartz furnace over the iron pot furnace, also, a greater capacity per sq. ft. of floor space and a greater saving in the cost, due to not having iron pots to contend with other than those in the receiving furnace. They have found them to last twenty-five working day because of not having to run the fire continually as they do when melting in the pot furnaces.

There are two oil burners directly in the top of this furnace in the center, with one air pipe blowing directly between the flame from these two burners. This flame and air meet just above the bath of metal which spreads the flame equally throughout the furnace.

There are two flues 8"x8" on each end of this furnace at the top. The flame on leaving the furnace passes around the air pipes which heats the air going into the furnace to a very high temperature.

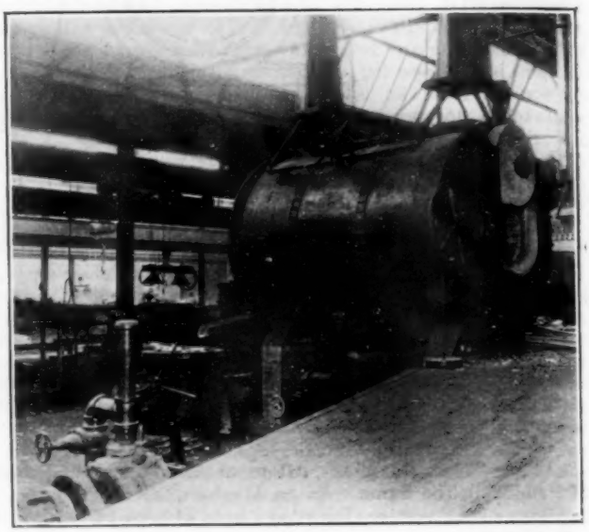
From recent gas tests the gases in this furnace remain the same during the entire time of melting and no gases which were detrimental to aluminum were found to any greater extent than in any other type of furnace.

TEST ON SCHWARTZ ALUMINUM FURNACE.

	No. 1	No. 2
Pure Aluminum	504	504
Alloy Aluminum (50-50)	96	96
Refined	400	400
Total Charge	1,000	1,000
Metal taken out of furnace	980	980
Dross 8 lbs. 50% Reclaimed	4	3
Total Metal	984	983
Metal Loss	16 lbs.	17 lbs.
Percentage of Loss	.016%	.017%
Start to Charge	9:55 A. M.	11:10 A. M.
Finish Charge	10:00 A. M.	11:15 A. M.
	11:00 A. M.	12:15 Noon

Following is a report on oil tests made on old style aluminum pot melting furnaces and on Schwartz aluminum melting furnace:

	Aver. lbs. per run	Aver. time per run	Aver. oil consumption per run	Aver. lbs. per gal.	Aver. lbs. per hour	Aver. gal. per hour
Pot Furnace	5,574	7 hrs. 44 min.	70.8	77.3	720	9.12
Schwartz Furnace	10,896	8 hrs. 9 min.	114.6	95.0	1332	14.04

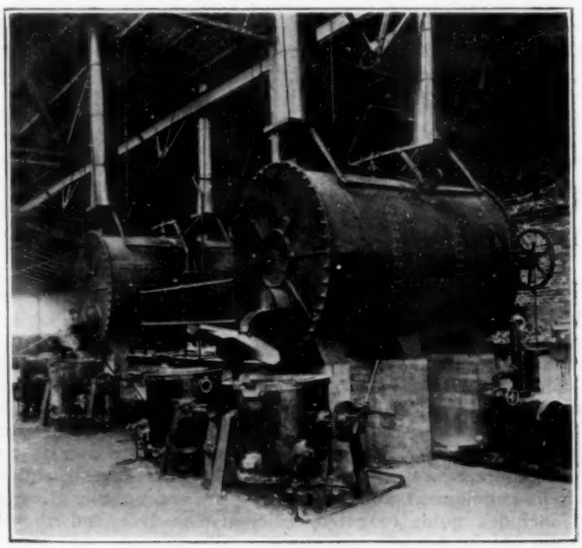


SCHWARTZ ALUMINUM FURNACE—CHARGING END

From these tests the capacity of the Schwartz furnace is 45.9% greater than the pot furnace and the pounds of metal melted per gallon of oil is 18.6% greater.

The furnace is manufactured by Edward H. Schwartz, 2247 Lincoln Ave., Chicago, Ill.

The upkeep of this furnace is said to be low. This concern had been running one furnace for over one year, had not had to reline it and did not see why it should not run for another year if properly taken care of.



SCHWARTZ ALUMINUM FURNACE—TAPPING END

AUTOMATIC LATHE FOR SHORT PIECES

The Baird Machine Company, of Bridgeport, Conn., has put out a machine that is designed for handling a product that can be held in a chuck, as castings, forgings and cut off bar stock, and which requires a number of separate and distinct operations, as turning, facing, chamfer, form, drill, bore, ream, thread or any other regulation lathe work.

The machine handles five pieces of work at one time. There are six spindles, five spindles would be in an operating position while the sixth spindle would be in an unloading and loading position. As the finished piece reaches the unloading position the machine automatically stops so that inattention by the operator will not cause work to make a second cycle of operations. The operator can immediately start the machine and the five work spindles need not be stopped to remove the finished piece or put in a new one. On work where it might be more economical to do so, the machine can be set to run without stopping.

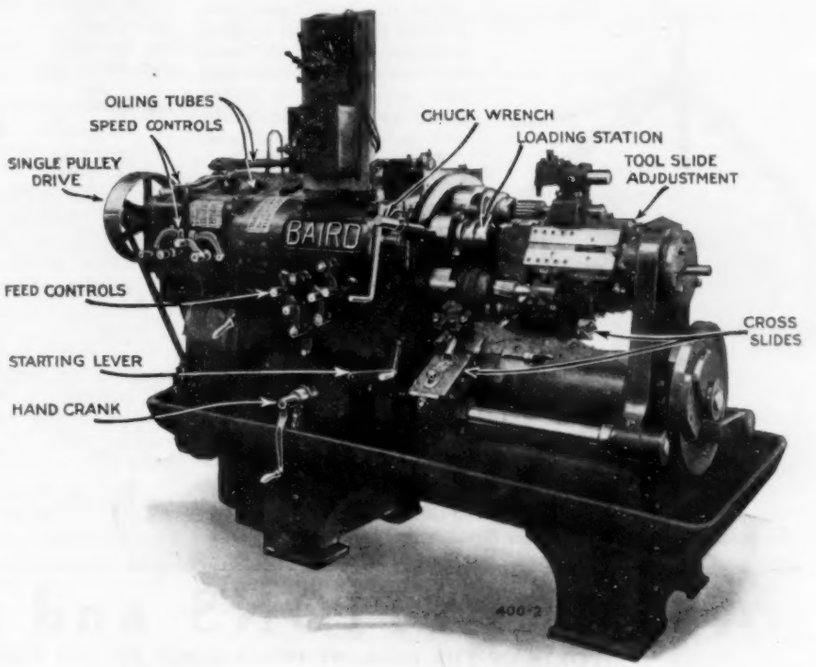
There are always five pieces of work in the machine and each one of them is being operated upon at the same time. As many as 21 cutting tools can be used at one time.

The average speed of the driving pulley is 800 r. p. m. This will produce a minimum spindle speed of 28½ r. p. m. and a maximum of 440 r. p. m.

To take care of the spindle speeds between these limits there are eight possible combinations of the drive gears and three of the spindles, giving a total of 24 speeds. This permits of any spindle being run at any one of three different speeds. For example: should the combination selected require that one spindle should operate at 20 r. p. m., each of the remaining four spindles might be operated at speeds of either 20, 30, 40 r. p. m. Any spindle at any one of these three speeds. In addition, there are 17 speeds for the feed of the cutting tools.

The minimum productive speed, with driving pulley running at 800 r. p. m., is claimed to be one piece in nine minutes; the maximum, 2⅔ pieces in one minute.

It is stated by the manufacturers that the spindle and feed speeds can be arranged so as to give the greatest productive speed for the work in hand; thus—a hole of small diameter can be bored at a high rate of spindle and cutting speed, while at the same time the outside circumference of the work might be turned at the best speed for that operation.



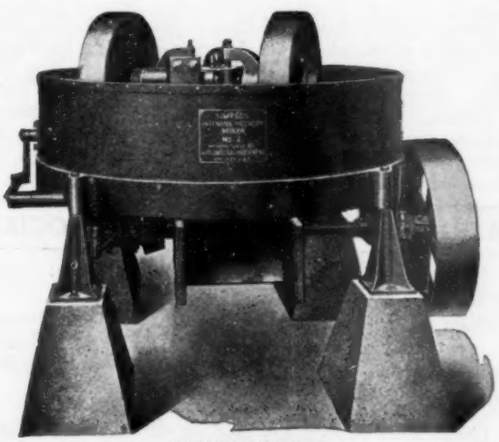
BAIRD AUTOMATIC LATHE

SIMPSON INTENSIVE FOUNDRY MIXER

This mixer, made by the National Engineering Company, 549 W. Washington Blvd., Chicago, Ill., is designed to mix not only core sand and facings, but the foundry sand mixtures as well as preparations for daubing furnaces.

It is made in four sizes varying from 3 feet in diameter to 8 feet, running up to 2,000 pounds capacity. Power required is from 3 to 25 horse power. They can be driven with either a tight or a loose pulley, friction clutch pulley or direct motor drive.

Features of special interest are: automatic discharge; mullers with removable steel tires; removable bushings and bronze vertical shaft; cast steel crosshead, rocker arm, flow beam, bevel gear and pinion; a ¾-inch steel wear plate.



SIMPSON MIXER

PORTABLE SPRAY PAINTING EQUIPMENT

The DeVilbiss Manufacturing Company, Toledo, O., announces a new series of DeVilbiss portable spray-painting equipment. This is said to be an improved and reliable line with which to meet any large or small painting requirement—from interior decorating to the largest building or structural job.

These new portable outfits, along with the wide range of DeVilbiss industrial finishing room equipment, makes it possible to fill practically any need in painting or finishing either structural work or manufactured products. They have issued an attractive illustrated folder, describing this new series, which will be sent on request.

CYANIDE SORE PROTECTION

A healing liquid called "I-Heal-U" has been placed on the market by E. Wambaugh & Company of Goshen, Ind. It is said to be applicable to the widespread plater's enemy, cyanide sores. It can be applied to hand, arm or foot and is sold under a money-back guarantee.

ELECTRIC SIFTER

The Wallace electric sifter can, it is claimed, sift a ton of moist molding sand in four minutes through a No. 2 riddle, delivering the sand perfectly cleaned and thoroughly mixed.

The light weight of the sifter permits it to be hung from any convenient support at any desired height, and every molder can easily move it over his sand pile or sift directly over core trays or flasks. The greatest vibration is only 5-16" from its vertical position—and they never have to dodge about to catch the riddle with their shovelfuls of sand.

WALLACE ELECTRIC SIFTER

The capacity of the Wallace electric sifter is said to be a result of the unusual electric motor which is connected direct to the riddle. It is a vertical G. E. motor in which the armature and shaft remain stationary and the field and housing revolve at high speed, the housing being weighted on one side by an extremely rapid and regular vibratory motion similar to that of an eccentric flywheel.

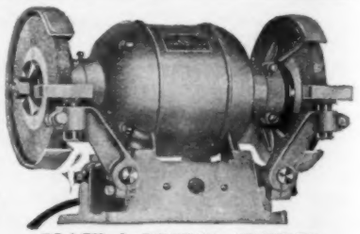
Because of the direct connection of motor to riddle, it is claimed that a minimum of power is required, since no power is lost through transmission or friction and because the motor is completely equipped with specially designed ball-bearings of the self-oiling type.

This motor is enclosed in a dust and grit proof casing and cooling air is circulated around the motor by its own peculiar motion. The air is drawn in at the top of one arm of the supporting frame tubing and after circulating around the motor is expelled at the top of another arm. A valve trap at the air intake prevents dust and dirt entering motor.

The machine comes equipped with an 18-inch riddle with No. 2 screen, which can be readily changed or removed by simply loosening the riddle clamps. It is made by J. D. Wallace & Company, 1401 West Jackson Boulevard, Chicago, Ill.

ELECTRIC GRINDER

The Black & Decker Manufacturing Company of Tonson Heights, Baltimore, Md., has placed on the market a new 8" electric grinder. This grinder is fitted with D. C. or A. C. motor.



BLACK & DECKER GRINDER

It is stated that special attention has been given to the bearings to make the grinder durable and serviceable; built for years of heavy duty. It calls for one-half horse power with grinding wheels molded on motor shaft.

Size of wheels	8" diam. by ¾" face
No. of load speed	3600 r. p. m.
Net weight	75 lbs.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

Headquarters, 140 South Dearborn Street, Chicago, Ill.

A meeting of the Board of Directors of the American Foundrymen's Association was held in Chicago, Tuesday, October 3rd.

In the morning was held the final meeting of the old, or the retiring Board. At this meeting reports of the secretary-treasurer, manager of exhibits, and of standing and special committees were received. The retiring president, W. R. Bean, was elected to honorary membership.

In the afternoon the new Board of Directors organized with President C. R. Messinger in the chair and twelve directors present.

The Board completed its organization by electing C. E. Hoyt, secretary-treasurer; R. E. Kennedy, assistant secretary; R. A. Bull, S. T. Johnston, L. W. Olson and Fred Erb, who, together with the president, vice-president and secretary will constitute the Executive Committee of the Board of Directors for the coming year.

C. E. Hoyt was elected manager of the Department of Exhibits.

The directors provided for a permanent Board of Awards, consisting of the seven last living past presidnets of the American Foundrymen's Association, Inc., with the junior past president as chairman of the board.

An invitation was received from the Association Technique de Fonderie of France, inviting the A. F. A. to join with the foundrymen's associations of France, England and Belgium in an International Convention and Exhibit, in Paris, the first fortnight in September, 1923. The invitation was accepted and referred to a committee to be appointed by the president, who will represent the A. F. A. and determine to what extent the association will take active part in the proposed international convention.

Mr. S. Griswold Flagg, 3rd, of Stanley G. Flagg & Co., Philadelphia, Pa., was elected a director to fill the vacancy caused by the death of J. P. Pero.

Invitations for holding the 1923 Convention and Exhibit were presented and referred to a special committee for consideration.

Following discussion of plans for association activities the coming year, the meeting adjourned.

Following adjournment, the special committee took under consideration the invitations for the next convention, with the result that a report was submitted to the Board of Directors recommending that the next convention be held in the city of Cleveland, and by mail ballot filed October 23, Cleveland was selected with Saturday, April 28, as opening day for the exhibits, and Monday, April 30, as opening day for the annual convention, both convention and exhibits closing Thursday, May 3.

It is proposed to make Saturday, the 28th, Cleveland Day for the inspection of exhibits.

The above is a brief summary of a meeting lasting from 10 a. m. to 7 p. m., during which time a great many association activities were reported on and decisions made regarding work for the coming year.

The Committee on International Relations, to whom the invitation from the French association for a joint convention was referred, has been appointed by President Messinger and is as follows:

Chairman—H. Cole Estep, 2-3 Caxton House, Westminster, London, S. W. 1, England. Vice-chairman—Stanley G. Flagg, Jr., Stanley G. Flagg & Company, Philadelphia, Pa. (president A. F. A. in 1908). Members—L. L. Anthes, Anthes Foundry, Ltd., Toronto, Canada (president A. F. A. in 1909); G. H. Clamer, Ajax Metal Company, Philadelphia, Pa.; A. O. Backert, The Penton Publishing Company, Cleveland, Ohio; Franklin G. Smith, Osborn Manufacturing Company, Cleveland, Ohio.

AMERICAN ELECTRO-PLATERS' SOCIETY

The following members have been appointed to the Committee of Research and Education:

William Delage, chairman	Waterbury Branch
O. J. Sizelove	Newark Branch
E. G. Lovering	Detroit Branch

PHILADELPHIA BRANCH

Headquarters, care of P. Uhl, 2432 N. 29th St.

The Philadelphia Branch will hold its eighth annual banquet on

Saturday, November 25, 1922, in Mosebach's Hall, 1241 Gerard avenue. Tickets will cost $3. Exhibits will be shown and papers read at 3 P. M. The banquet will take place at 7 P. M.

NEW YORK BRANCH

Headquarters, care of J. E. Sterling, 468 Grand Ave., Long Island City, N. Y.

The regular meetings of New York Branch were held on October 13 and 17, President Morningstar presiding. The article in THE METAL INDUSTRY on "Red Spots on Finished Work" was thoroughly discussed at the October 13 meeting.

The October 27 meeting was very interesting. A number of samples of barrel plating were shown by a member. The finishes were copper, nickel, tin, zinc and brass. The work was admired by all present. Among the articles were phonograph needles; the color and finish were all that could be desired. The formulas and procedure were given.

MONTREAL BRANCH

Headquarters care of Hudré Giroux, 48 Craig, W.

The Montreal Branch meets every Friday night at 48 Craig, West.

Personals

H. B. Hanley, formerly metallurgical chemist and foundry superintendent for the New London Ship & Engine Company, Groton, Conn., is now employed by Whitehead Brothers Company, New York, Buffalo and Providence. Mr. Hanley will devote his entire time to investigations of foundry raw materials and consulting work.

T. C. Eichstaedt has severed his connections with the Bennett-O'Connell Company, of Chicago, and has connected with the Ainsworth Manufacturing Company, Detroit, in the capacity of supervisor of polishing and plating department.

Herbert J. Maroney has resigned as vice-president of the General Smelting Company, of Philadelphia, and has joined the Eagle Smelting & Refining Works, of New York, in charge of their zinc by-products department, with office in the Heymann Building, Philadelphia, Pa.

Dr. S. W. Stratton, for 21 years director of the Bureau of Standards of the Department of Commerce at Washington, has resigned and accepted the presidency of Massachusetts Institute of Technology, Boston, Mass., beginning January 1. Thomas A. Edison has referred to Dr. Stratton as 100 per cent efficient. It is not known who will succeed him as director of the bureau.

It has been stated in Mining & Metallurgy for October that **Charles T. Bragg,** recently works manager of the Michigan Smelting & Refining Company, Detroit, Mich., is now president and general manager of the Michigan Valve & Foundry Company, Detroit, Mich.

Frederick Franz, who, for the past four years, was chief engineer of the Terminal Engineering Company, has established an engineering office at 27 Warren St., New York, for the purpose of solving special problems of engineering relating to labor saving machinery for industrial plants.

Thomas H. Wickenden and **Charles McKnight, Jr.** have recently joined the development and research department of the International Nickel Company, New York, to undertake development work in connection with alloy steels. Mr. Wickenden was for many years associated with the Studebaker Corporation as engineer-in-charge at the South Bend plant and more recently associated with Zeder-Skelton-Breer Engineering Company in a consulting capacity. Mr. McKnight was formerly works manager of the Carbon Steel Company and engaged for many years in the production of alloy steels.

Deaths

JOHN J. WILLIAMS

John J. Williams died at the home of his son, Frank Williams, at Greenwich, Conn., September 4, at the age of 77. He was connected with John Davol & Sons about 15 years ago, and ended his connections with the metal trade at that time with the going out of business of the above firm.

CHARLES GLOVER

Charles Glover, formerly president of the Corbin Screw Corporation of the American Hardware Corporation, died at his home in New Britain, Conn., on October 26th, in his 76th year. He had been ill for two years and in that time had not been actively engaged in business. Mr. Glover was one of the best known manufacturers and mechanical engineers in New England and was actively identified in many manufacturing concerns. Among others, he was a director of the American Hardware Corporation; president of the Corbin Motor Vehicle Corporation; president of the Skinner Chuck Company; president of the D. C. Judd Company; a director of the North & Judd Manufacturing Company, and a director of the Aetna Nut Company. His widow and one daughter survive.

CHANLER N. WAYLAND

Chanler N. Wayland, formerly one of the most prominent men in Waterbury, Conn., died recently in Stonington, Conn. He was formerly president of Holmes, Booth & Hayden, now one of the component parts of the American Brass Company. His grandson, Elton B. Wayland, resides in Waterbury.

FRANK SHERMAN WASHBURN

Frank Sherman Washburn, chairman of the board of directors of the American Cyanimid Company, New York, died at his home in Rye, N. Y., October 9, 1922, due to bronchial pneumonia.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

NOVEMBER 1, 1922.

Employment figures in the city's seven largest plants as compiled by the local Chamber of Commerce office for the United States Department of Labor, again show a very healthy increase. On October 15th, 409 more persons were actually employed than on September 15th. The total now employed in the seven representative plants is 12,163 against 11,754 a month ago. The increase since the first of the year is over 2,500, which shows that the condition has been steadily improving all the year.

Judge Walter D. Makepeace has been appointed fuel administrator for the city by State Fuel Administrator Thomas W. Russell. **Irving H. Chase,** head of the **Waterbury Clock Company,** was the local fuel administrator during the war and recommended Judge Makepeace.

Judge Thomas, of the United States District Court, has

ordered the case of the **Eastern Brass & Ingot Company**, one of the city's war time concerns, to be heard before a jury in Hartford next month. Attorney J. H. Cassidy, representing many of the concern's creditors has filed an involuntary petition in bankruptcy, claiming the concern is bankrupt. Attorney C. C. Hincks, counsel for George E. Dalbey, the receiver, contends that the firm is not bankrupt. Attorney Cassidy has blocked several attempts on the part of some of the creditors to have the assets of the firm sold, contending that such an act would constitute a preference for some of the creditors. The judge, after hearing several arguments, declared that if it were really bankrupt its affairs should be handled immediately in the bankruptcy court and if solvent then its name should not be linked with bankruptcy proceedings and for this reason approved a trial by jury to settle the question, counsel for the company having insisted on its right for a jury trial and not a trial by the court alone.

First steps toward the establishment of a traffic bureau were taken by representatives of the various industries at a meeting October 20th. **John D. Heffernan**, traffic manager of the **Scovill Manufacturing Company**, has been asked to arrange with the assistant secretary of the Chamber of Commerce for securing information for files at the office and to bring to the city some noted traffic manager. **H. B. Brew**, traffic manager of the **Oakville Company**, will assist in compiling the data that will make the local office a bureau of information for traffic managers of the city, especially giving the latest reports on embargoes on various roads. Those attending the organization meeting were: **John Lynch**, of the **American Pin Company**; **P. W. Brown**, of the **Chase Companies**; **Joseph Cavanaugh**, of the **Farrell Foundry**; **John Potter**, of **Randolph & Clowes**; **T. J. Smith**, of the **Patent Button Company**; **J. Stapley**, of **Steele & Johnson's**.

The **French Manufacturing Company**, of this city, has increased its capital stock from $100,000 to $400,000.

Frederick Doolittle, 47 years of age, a foreman in the employ of the **Oakville Company**, died October 5th.

Sandy A. Debner, former superintendent of the **Waterbury Button Company**, and more recently general manager of the Pruven Composition Products Manufacturing Company of Bridgeport, and who stands charged with theft from his former company, succeeded, through counsel, in gaining a continuance until October 14th when tried in the local city court, October 5th. At the trial, October 14th, he was bound over to the Superior Court under bonds of $1,000. Debner was taken into custody by Deputy Sheriff Tierney of this place and brought here. It is understood his claim is that he committed no offence against the statutes in having in his possession certain property claimed by the local concern.

W. R. B.

BRIDGEPORT, CONN.

NOVEMBER 1, 1922.

Employment figures taken from 31 local factories show that there were 16, 870 employed on October 15th, 126 more than on the previous week, which is 66.6 per cent of high normal and the best showing since April, 1921. The number of men hours during the week was 840,629 or 67.8 per cent of high normal and the highest showing in two years. The average hours worked per employee in the 31 shops was 49.8, which is higher than any record since active war period. The Bryant Electric Company has started a 55-hour week, or five hours per week overtime. The average of hours worked in all the other factories is 50 hours a week.

The **Lake Torpedo Plant** is to close shortly when it completes the last of the Government orders it is now working on, for an indefinite period, **Simon Lake**, its president has announced. For the past 20 years it has been working entirely on Government orders with the crux of its activities reached during the war period. No plans have been made for the future disposition of the works, Mr. Lake said.

The employees once numbered 2,000 but since the war have shrunk to 250. The last boat it is making is the S-48. A small personnel will be retained after closing to look after the property. During the war the company established a record by putting out 25 boats a year.

Carefully guarded from the eyes of all except those engaged in its construction the **Connecticut Light & Power Company** is rushing to completion by the Fall of next year, one of the biggest electrical power projects in the East, to be located on the bank of the Housatonic at Devon and to cost $4,000,000. There is much speculation as to where the plant will find a market for the power produced in such a mammoth plant, it having a capacity of 150,000 kilowats. One theory is that the company in the near future will provide practically all the power in Connecticut, running small feeders to operate the dynamos of smaller companies. Another is that it will feed the power wires of the New Haven road.

Should Boston be successful in securing a better connecting rail rate from the middle and central western states on export goods, Bridgeport would benefit. Though some of the local exporting is handled by forwarding agents, an appreciable amount is sent through to destination.

The fifth annual banquet of the **Crane Veterans League** was held last month. It is composed of employees of 25 years' service with the Crane factories. The oldest man in point of service is Alexander McGill, who has been in service 50 years.

W. R. B.

TORRINGTON, CONN.

NOVEMBER 1, 1922.

Joseph M. Travis, superintendent of the tube mill of the Torrington plant of the **American Brass Company**, and **Frederick L. Dougal**, assistant superintendent, have severed their connections with the company after many years of service.

THE METAL INDUSTRY correspondent learns from an authoritative source that two or three departments of the office of the Torrington branch of the American Brass Company are to be moved to the main office in Waterbury.

The big addition to the Torrington branch of the American Brass Company is nearing completion.

Practically all the local plants are operating on full schedules with full working forces; and the business outlook in the various metal lines is good. The coal shortage fortunately has necessitated no noticeable curtailment of operations. Figures compiled from the recent school enumeration indicate that many families which left town in the period of industrial depression following the war, are returning here.

A memorial tablet for the late **James A. Doughty**, first president of the Charlotte Hungerford hospital, has been placed in the hospital by the physicians of Torrington.

George H. Atkins, formerly of the **Turner & Seymour Company**, has been appointed fuel administrator for Torrington. Mr. Atkins served in that capacity during the war.

The new building recently erected at the **Union Hardware** plant is being used for storage purposes and to house the department moved here recently from the branch in Canaan.

The Union Hardware company recently increased its capital stock, as reported in THE METAL INDUSTRY, and is said to be planning several substantial additions to its plant.

Henry G. Ellis, of the **Torrington Manufacturing Company**, left October 24th for a six weeks' business trip to England.

J. H. T.

NEW BRITAIN, CONN.

NOVEMBER 1, 1922.

Renewed activity in several local factories, notably the **P. and F. Corbin** division of the **American Hardware Corporation**, has necessitated night work in several departments, a thing that savors strongly of the pre-war normalcy times. Other local concerns are almost equally busy and there is every good outlook for a busy winter.

At the **North & Judd Manufacturing Company**, **Frederick Holmes** has been elected president to succeed the late **Howard C. Noble**, but the policy of the plant is practically unchanged and no radical departures are planned, thus assuring a continuance of present conditions. The **Traut & Hine Manufacturing Company**, as is the previously named concern, is enjoying a period of unusual prosperity, due in a large measure to the proximity of the holiday season. These firms make metal novelties, buttons, clasps, buckles, etc. The **Landers, Frary & Clark** factory is continually expanding, due to its in-

creased production of cutlery and electrical appliances of all sorts, and within the past few weeks has started construction of a large factory addition.

ROCHESTER, N. Y.

NOVEMBER 1, 1922.

From a manufacturers' viewpoint the tide in business conditions has finally turned in the right direction and from now on the output from Rochester's metal-using plants will show decided increases from month to month.

This opinion was expressed by a leading official of the **Eastman Company,** who said he felt safe in declaring himself after talks with various persons in authority in the larger manufacturing establishments in the city. Purchasing agents report that reserve stocks are being drawn on more heavily than in over a year past and larger orders are given for shipment of raw materials to reinforce the stock rooms.

Reports from brass foundries, however, are of an irregular character. Several of the larger foundries are doing a fairly large business in a general way, while a majority claim business is no better than in September. It is a fact, however, that more brass workers are at work in Rochester.

Better business conditions prevail in the plants of the **General Railway Signal Company,** the **Pfaudler Company, Bausch & Lomb Optical Works,** the **Gleason Company** and the **Erdle Perforating Company.** These concerns employ large quantities of copper, brass, tin and zinc in manufacturing.

Among the wholesale dealers it is said the demand for brass sheets and rods have improved fifty per cent during the past month, owing to continued heavy building in all parts of the city. Trade in tin is much better. Lead is steady.

A new manufacturing plant is about to be established in Palmyra. It will be known as the **Palmyra Pump and Accessories Company.** The plant will produce a number of patented automobile accessories, including a newly-devised headlight. From 60 to 100 persons will find employment there. Tin, brass, nickel, copper and steel will enter into the making of these devices. G. B. E.

TRENTON, N. J.

The **Eberhard Watch Corporation,** recently incorporated at Trenton, N. J., with $300,000 capital, will erect a modern factory at that place for the manufacture of a watch modeled after the Swiss watches. It is the intention of the company to employ about 500 hands in the making of a high grade watch.

William C. Matlack, of Trenton, has been appointed by Federal Judge Lynch as receiver of the **Wittman Jewelry Company,** of Trenton. The receiver was appointed at the instance of New York creditors. The liabilities of the concern are $50,000 while the assets are $33,000.

The Royal Eighteen Karet White Gold Company, Inc., of Newark, has been incorporated at Trenton with $100,000 capital to deal in gold. The incorporators are S. P. Pressler and Herman A. Sarwin, of Newark.

Guarantee Electric Company, Inc. has been incorporated at Trenton to deal in electrical goods in Atlantic City. The capital stock is $125,000 and the incorporators are George P. Proffat, Katherine B. Proffat and Walter Hanstein, of Atlantic City.

Jacob Burack & Company, manufacturing jewelers, of 50 Columbia street, Newark, N. J., have been declared bankrupt according to a petition filed in the United States District Court at Trenton. It is claimed that the company's liabilities are $28,000 and the assets $6,000. Creditors have asked the court to name a receiver for the concern. The assets of the company comprise jewelry on hand and the fixtures.

Frederick J. Israel has been named by Federal Judge Lynch as receiver of the **Tousek Engineering Company,** manufacturers of radio supplies at 228 Jeliff avenue, Newark. Proceedings are pending in the Court of Chancery to dissolve the corporation. C. A. L.

CLEVELAND, OHIO

NOVEMBER 1, 1922.

W. R. Mitchell, of the **National Acme Manufacturing Company,** was elected president of the East End Manufacturers' Association at a meeting last week, and he presented an amendment to the constitution of the association which was unanimously accepted, providing for action toward establishment of the open shop plan in the factories embraced in the association.

This action marks the biggest employers' unit ever to declare for the so-called "American plan" in Cleveland. In addition to many of Cleveland's largest industrial enterprises, this policy affects thousands of workers. Among the plants of the association are: **Cleveland Metal Products Company, Kuhlman Car Company, Apex Electrical Manufacturing Company.**

Railroad traffic congestion is restricting production in several large factories in this city, due to the fact that they are unable to obtain materials from the plants of the Youngstown and Pittsburgh districts.

The Cleveland Metal Products Company's car shortage is estimated at 35 to 45 per cent of its requirements.

A. W. Henn, president of the **National Acme Company,** says that manufacturing costs in the metal products industry show little reduction from a year ago. Meanwhile wages and materials have advanced, and this puts the metal products manufacturers in a position where, he believes, an adjustment will have to be made either in costs or selling prices to bring the industry to the same basis as others.

A half million dollar suit was filed this week against the **Cleveland Brass and Copper Mills.** The suit, it is said, is to collect on notes and bonds given by the company during the war to obtain money and machinery, advanced by the government, to aid in the manufacture of war materials.

Frank A. Scott, of the **Warner and Swasey Company,** gave an interesting talk on the **"Development of Metal Working in Cleveland"** before the Council of the Associated Technical Societies of Cleveland at a recent meeting at the Hotel Winton.

DETROIT, MICH.

NOVEMBER 1, 1922.

So far as the metal industry is concerned, and this of course, includes the automobile business, Detroit has more than recovered from the setback of a few weeks ago. Practically all plants that in any way are connected with the copper, brass and grey iron business are doing a fine business. This, of course, is due principally to the big automobile trade. Manufacturers of plumbing supplies also report a fair proportion of business. This has been brought about by the revival in building, which, until the present year, was more or less stagnated.

It looks just as present as if the country would soon witness one of the keenest automobile price slashing wars that ever has taken place. The **Ford Motor Company** already has made a cut of $50 on all of its cars. This has so stimulated business that the company is far behind in its orders. The **Durant** organization in Flint, Mich., also has entered the Ford field with an exceedingly attractive car, and it is expected there wll be more or less competition between these two organizations. Other cuts are expected in both these makes and it is possible others will follow.

The fuel situation seems to be fairly good at present, although there is no great quantity of coal in reserve. Anyway there is sufficient in sight to keep the plants in operation for a considerable time. Just at present there seems to be but little anxiety along this line.

The labor question is normal. Comparatively few men are out of work. The demand for unskilled labor in the automobile and accessory plants is not so brisk, but apparently there is ample work for skilled mechanics. F. J. H.

MONTREAL, CANADA

NOVEMBER 1, 1922.

Business conditions in the non-ferrous plants here are now well above normal. All the shops are running with increased number of employees and the workers are getting out from 15 to 25 per cent more production compared to pre-war days. The business improvement has been specially marked in the

past two months, and since the rail and coal strikes have been settled there is every reason to believe that prosperity is here to stay.

A fire damaged the roof of the **W. R. Cuthbert & Company Brass Foundry,** located at 37-39-41 Duke street, and has shut them down for the past week. A force of workmen is employed at present placing a new roof and it is now under cover. The foundry will be in operation after a short shutdown.

Canada Brass Company, Craig street, is running to full capacity. Owing to building conditions being in such a prosperous condition the demand for plumbing steam heating and hardware brass goods is enabling the concerns in this line to keep their plants fully employed. P. W. B.

BIRMINGHAM, ENGLAND

NOVEMBER 1, 1922.

A little further improvement in business has been experienced in the metal industries of this district. Additional men are being employed in the brass foundries. Demand for steam and water fittings both in the home and in the foreign markets have slightly increased. The cabinet branch of the trade is reaping some benefit from the increased building of houses of the better class and builders' and plumbers' brass foundry generally is in a little better request. Rollers of copper, brass and nickel silver sheets have recently found a little more to do, but, taking the metal trades all round, full employment is yet far from being reached. The market in raw materials and scrap retains a nominal firmness, but business in scrap metals is by no means brisk and concessions have to be made to obtain orders. In the jewelry trade the depression continues. The seaside business, owing to the high charges for traveling and board, has been disappointing and large stocks of cheap goods remain in stock, with the result that the increase in activity induced by the approach of Christmas is very much less than usual. No further light has been shed upon the mystery of the disposal of the Government's brass surplus, and, as a general election is imminent, there will probably be no opportunity to bring the matter up in the House of Commons as was intended. Manufacturers in all the metal trades are endeavoring to stabilize wages for a definite period in order to facilitate the quotation of firm prices. In the brass trade an agreement for reduction which will anticipate by a few months any reduction which may become due in the meantime on the sliding scale governed by the Board of Trade "cost of living" figures. G.

Business Items Verified

Work has been started by **Dwight P. Robinson & Company** on the design and construction of an extension to the plant of the American Rolling Mill Company at Ashland, Ky. The extension will include a jobbing and sheet mill and a galvanizing plant.

The Superior Flake Graphite Company, Chicago, Ill., has purchased a 7-ft. **Hardinge Ball Mill** for grinding flake graphite to through 200-mesh.

The Evans & Howard Fire Brick Company, St. Louis, Mo., has purchased a 5-ft. **Hardinge Ball Mill** for grinding grog.

The office and manufacturing divisions of the **Lamson Company,** mechanical appliances, which were located in Boston and Lowell, Mass., have been consolidated in its new plant at Syracuse, N. Y.

The Chicago Machine Products Corporation, manufacturer of automobile locks, 14 South Jefferson street, Chicago, Ill., has leased the one-story factory now under construction at 4711-15 West Lake street. It contains 10,000, sq. ft. of floor space.

The General Electric Company, Ft. Wayne, Ind., will erect a new one-story tank shop, 100 x 150 ft., to cost about $30,000.

A two-story brick building at 24-26 Vanderbilt avenue, Brooklyn, N. Y., has been acquired by M. H. Smith for the use of **Henning Bros. & Smith, Inc.,** dealers and smelters of metals for the use of the new company. It will be one of the most modern plants together with a large warehouse and machine shop. The present purchasing and sales office will be found at 263 Front street, N. Y., and a Greenpoint Warehouse will be found at Engert avenue and Eckford street.

Wayne Tank & Pump Company, Fort Wayne, Indiana, has completed an addition to their plant which is constructed exclusively for light tank work.

The Eager Electric Company, of Watertown, N. Y., is moving its old equipment out of the old quarters and placing it in a new addition to the brass foundry.

The Birmingham Stove & Range Company, Birmingham, Ala., has preliminary plans for the construction of an addition to its plant. A new department will be installed for the manufacture of gas ranges. B. H. Hartsfield is general manager of the company.

The Invincible Metal Furniture Company, Manitowoc, Wis., is remodeling a portion of its plant and adding a one-story building 25 x 80 ft. to serve as a nickel plating shop, which with equipment will cost about $10,000. Formerly this work was done under contract with outside platers. It manufactures vault doors, safe deposit boxes, fireproof cabinets, furniture, etc.

The Imperial Clock Company, Collinsville, Ill., is planning for the installation of precision lathes, drill presses, grinders, punch presses and other tools. They have purchased all of the equipment that they are going to install at present, but may be in the market by the latter part of next spring.

The Ternstedt Manufacturing Company, Artillery and Muster Sts., Detroit, Mich., manufacturer of automobile hardware, has filed plans for a new one-story addition on Artillery Street, estimated to cost approximately $235,000, with equipment.

The Hayes Wheel Company of Canada, Ltd., Chatham, Ont., which recently took over the plant of General Forgings & Stampings, Ltd., at Merritton, Ont., is installing equipment for the manufacture of outside automobile rims. It is also transferring the metal stamping equipment to the Chatam plant. The forge plant will not be disturbed, but the business will be increased.

The controlling interest in the **"1900" Washer Company,** Binghamton, N. Y., manufacturers of electrically-operated washing machines, has been acquired by the Binghamton Washing Machine Corporation, organized under State laws with a capital of $800,000. The new owner will take immediate possession of the plant and proposes to increase the output. The purchasing company is controlled by the Maynard H. Murch Company, Union National Bank Building, Cleveland, investment securities, and Walter S. Quinlan, vice-president and secretary of the latter company, will be president of the new organization; T. W. Behan, formerly general manager of the 1900 Washer Company, will be vice-president, and W. G. Trowbridge, secretary and treasurer.

The Rome Wire Company, Rome, N. Y., announces that the recent report that they were completing plans for the erection of a two-story branch at Niagara Falls, Ont., is absolutely incorrect.

To assist students working their way through **Carnegie Institute of Technology,** the Jones and Laughlin Steel Company, of Pittsburgh, has arranged to employ students in the steel mills on Friday and Saturday nights or all day Saturday. The shifts are of ten hours' length. Jones and Laughlin is the first large concern in Pittsburgh to come to the aid of students in need of finances. The arrangement is pleasing to the administration at Carnegie Tech because of the opportunity it gives to the students in the College of Engineering to acquire practical as well as theoretical knowledge.

H. J. Zinn Cutlery Company, Eighth avenue and Ninth Street, Altoona, Pa., has been incorporated with a capital of $100,000 to manufacture cutlery products. It specializes in the manufacture of a special keen edged electro silver-plated knife, rib enforced, that requires no grinding. Properties have been leased and equipment is being installed. It is in the market for steel products required by its line. The incorporators are: J. H. Brindle, Altoona, Pa., H. J. Zinn, Kingston, Pa., and W. M. Sellers, secretary-treasurer, Altoona. This firm operates the following departments: grinding room, plating and polishing.

Dominick & Haff, North Attleboro, Mass., manufacturers of silver hollow ware and cutlery products, have leased space in the Bigney Building for increased production and will commence operations in the new quarters November first. This firm operates the following departments: spinning, stamping, soldering and polishing.

The Western Electric Company, Philadelphia, Pa., with main plant at Hawthorne, Ill., has awarded contract to Barclay, White and Company, 1713 Sansom Street, for a new five-story building, 910-14 Cherry Street, to cost $150,000. The building is being erected by Geo. B. Clopp, from whom they will lease it.

The American Brake Shoe & Foundry Company, 30 Church Street, New York, has purchased 17 acres at Portsmouth, Va., as a site for a new works.

The Auburn Brass Foundry, Cranston, R. I., recently was organized by Axel W. Bergman and William Bergman, Providence, R. I. They make a specialty of French sand molding, tablets and small figure work.

The Electrical Appliance Manufacturing Company, Waterbury, Conn., is perfecting plans for considerable increase in production. It recently increased its capital to $100,000. They are going to build a brick factory 50 x 150, two stories, and will need additional equipment including lathes, shapers, milling machinery, large and small presses, plating equipment, etc. This firm operates the following departments: brass machine shop, tool room, cutting-up shop, plating, stamping, soldering and lacquering.

Marsh Valve Company, of Dunkirk, N. Y., has completed an addition to its plant to be 25 x 35 which is to be used for boiler room for heating plant. The firm operates the following departments: brass machine shop, tool room, and plating.

The New England Smelting Works, corner Fisk street and Wason avenue, Springfield, Mass., are moving to Day and Union streets, West Springfield, Mass. The new plant is 115 x 125 ft., and has a railroad siding. They will put in several new gas furnaces and several crucible furnaces. The plant will be adjacent to Gilbert & Barker Manufacturing Company plant.

The **Home Accessories Corporation,** Worcester, Mass., manufacturer of metal bathroom fixtures and kitchen wire goods, has plans for a new two-story factory, 45 x 110 ft., estimated to cost $40,000. The concern operates a tool room, plating, stamping, tinning, polishing, lacquering and electric welding departments.

BRITISH BRASS DEAL MYSTERY

Excitement over the sale of scrap metal which was made a few months ago by the British Disposal Board has been renewed by the publication of a statement by Rownson, Drew & Clydesdale, Limited, London. They allege that they entered into a contract with the Board to sell within thirteen months from March, 1920, £5,000,000 worth of surplus war material on a commission basis. But, they say, the Board failed to keep its part of the contract. For this failure the firm claim to be entitled to receive as compensation over £50,000. They say they do not want to take this money. They would rather do the work.

The gravity of their charge against the Disposal Board, however, is the enormous loss which the public exchequer has sustained. On the scrap brass alone they put the loss at £1,500,000, while it is suggested that probably a greater additional sum could have been saved, if the contract with them had been honored, by the earlier closing up of certain sections of the Board.

On October 26, 1921, it was stated in Parliament that 150,000 tons of brass scrap had been sold in one deal for £3,650,000 at £24 6s. 8d. per ton. The Rownson firm states that at that time they had the same material sold, subject to receiving it from the Disposal Board under their contract at £35, and that at earlier dates it could have been sold at still higher prices.

The purchaser at £24 6s. 8d. per ton was a syndicate calling itself the British Metal Corporation. When the news of the deal came out, meetings of metal merchants in London and Birmingham sent angry protests to the Government and demanded a Parliamentary inquiry. It was alleged that the British Metal Corporation was partly composed of men who had held office under the Disposal Board, and had thus been able, with their inside knowledge, to fix up a deal to the disadvantage of outside traders. Had the metal merchants of the country been given an opportunity to purchase from the Disposal Board direct they could, they said, have offered better terms.

Within ten days of the signing of the contract on September 28, 1921, as is proved by examination of the customs lists, shipments of this metal to Germany commenced. The bulk of the purchase in fact is believed to have been passed on to the German Metall-Gesellschaft and its subsidiary concern, the American Metal Company.

All the time there has been in existence a law, the Non-Ferrous Metal Industry Act, passed by Parliament for the express purpose of preventing the revival after the war of the monopoly of the world's metal supplies, including even those of the British Dominions, which the German syndicate had to a great extent secured. In spite of this, material which might have assisted in providing sorely needed employment for British labor has been allowed to get into German hands.

In reply to every demand for an investigation, the Disposal Board maintains that there is no cause for complaint. Sir Robert Horne, Chancellor of the Exchequer, to whom the appeal has been carried, supports the Board. But interest in the question is growing. Not only the metal trade but also the general public as taxpayers, and as concerned in the effect of the transaction upon British industry are clamoring for an explanation. P. J. Hannon, one of the members for Birmingham, and other members of the House of Commons are taking the matter up, and when Parliament meets in November the demand for inquiry will be renewed.—G.

WAR CLAIMS AGAINST GERMANY

All American claimants against Germany must formally file their war claims with the State Department within six months of October 10, when the first meeting of the international commission will be held in Washington.

This was announced at the State Department September 25, 1922, following a conference between under Secretary of State Phillips and Robert C. Morris, a New York lawyer, who will represent American claimants.

The United States Government member of the commission has not yet been announced, and the State Department has not yet received word from Berlin when the German agents will appear in Washington. It is assumed they will start from Germany before the end of the present week.

It will probably take considerable more than a year to clear up all the American war claims against Germany.—American Metal Market.

SAND CUTTER PATENT DECISION

It has been announced by the American Foundry Equipment Company that on October 17, 1922, Judge Geiger, of the United States Court, Eastern District of Wisconsin, declared the sand cutting machine made and sold by H. L. Wadsworth, of Cleveland, to be an infringement upon a patent owned and controlled by the American Foundry Equipment Company.

This decision was rendered in a suit brought by the latter company against the L. J. Mueller Furnace Company, of Milwaukee, a user of the Wadsworth machine, which suit was defended by H. L. Wadsworth and his counsel.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America.....	$100	$420	$460
American Hardware Corporation.....	100	208	212
Bristol Brass	25	17	20
International Nickel, com.	25	14½	15¼
International Nickel, pfd.	100	80	82
International Silver, com.	100	35	...
International Silver, pfd.	100	101	105
New Jersey Zinc	100	160	165
Rome Brass & Copper.....	100	110	125
Scoville Manufacturing Company	100	370	390
Yale & Towne Manufacturing Company.	...	365	375

Corrected by J. K. Rice, Jr., & Co., 36 Wall Street, New York.

A NEW ALLOY TO RIVAL GOLD

PARIS, Oct. 28.—An announcement was made today of the perfection of a new alloy which will rival in all its qualities the king of metals.

The new alloy, called oreum, is made by a young French chemist named de Mazarin. It has the brightness, durability and inoxidability of gold, which qualities will permit its substitution in jewelry and other manufactures where gold is now used.—New York Times, Oct. 29, 1922.

SCOVILL STOCK DIVIDEND

It has been stated in the daily press that a special meeting of the stockholders of the Scovill Manufacturing Company, Waterbury, Conn., was held on November 4th to increase the capital stock from $5,000,000 to $15,000,000. The directors will declare a stock dividend of 200 per cent by transferring $10,000,000 of the surplus to the capital stock. Authorization for the increase was granted by the State Legislature of Connecticut.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President, Whitehead Metal Products Company of New York, Inc.

Business in brass, copper and Monel metal is still being placed in large volumes and many of the mills are very far behind their orders for these products. Most of the manufacturers report a very serious curtailment in their output due to the shortage of common labor. It is stated that the numerous increases in wages which have been given to this class of labor have not attracted a very large number of men to the mills and the situation, in this respect, is still very troublesome.

Prices are at a level higher than they have been for some considerable time, and in spite of the increases in prices which were made effective during the summer, manufacturers still claim that the level is not high enough to enable them to make any money. It is stated that in the manufacture of brass and copper, many items enter to cut down the profits of the mills, such as the high price of labor and raw materials; for example, coal oil, lumber, etc., and other items which figure to a very large degree in the cost sheet.

Most of the manufacturers are predicting very freely that the present level of prices cannot be maintained and that they must go higher if the mills are to pay any reasonable return on the capital invested.

The probabilities are, that, any further advances in the price of ingot copper and spelter, even though they might be slight increases in price, would result immediately in a revision of prices in an upward direction on brass and copper products.

No one seems to be willing to predict just how soon this upward revision may be put into effect, but all the producers are of the opinion that such a revision must be made if they are to show any profit.

In nickel and Monel metal there still continues to be a very broad market and the demand for both of these items is increasing steadily. Production of Monel metal is now well under way, and it is probable, that during the month of November, shipments from the International Nickel Company's new mill will be in sufficient volume to enable the various agents to take care of the trade requirements with reasonable promptness. On account of the unavoidable delay in bringing the new Monel metal mill up to a position of large production, the stock of Monel metal has been very badly depleted and it has been impossible to secure many standard sizes. As indicated above, however, this production is now going forward very rapidly, and it is probable that during the next month or six weeks these stocks will be replenished so that the requirements of the trade can be met promptly.

TRADE PUBLICATIONS

Carborundum Anti Slip Tile.—A catalogue issued by The Carborundum Company, Niagara Falls, N. Y., describing in detail this new non-slip tile for walking surfaces.

Thermit Locomotive Repairs.—A pamphlet, 4th edition, No. 21, issued by The Metal & Thermit Corporation, 120 Broadway, N. Y., containing many revisions since the last edition was published, chief among which are instructions for applying important improvements in practice in Thermit welding.

All in the Day's Work.—A booklet issued by The Osborn Manufacturing Company, Cleveland, Ohio, solving the problems of the jobbing foundry by Roll-Over Jolt molding machines.

Type M-4 Demand Meter.—Bulletin No. 46,108, issued by the General Electric Company, Schenectady, N. Y., describing the Type M-4 Demand Meter, which is manufactured by them and designed for use in combination with a watthour meter, to indicate maximum demand.

Calido.—A folder issued by The Electrical Alloy Company, Morristown, N. J., describing resistance wire for pressing irons, toasters and cord-attached electrical heating devices.

Panels and Supporting Framework.—Bulletin No. 47,002, issued by the General Electric Company, Schenectady, N. Y., which contains much useful information for prospective buyers of switchboards.

Midwest Steel Sections.—A booklet issued by the Midwest Steel & Supply Co., Inc., 28 W. 44th street, New York, describing and illustrating the uses and advantages of Midwest Steel Sections in factory and foundry construction.

Will it Last?—A folder issued by the Bridgeport Brass Company, Bridgeport, Conn., setting forth the advantage of Plumrite brass pipe.

Medart.—Catalogue No. 43, issued by The Medart Company, Potomac and De Kalb streets, St. Louis, Mo., describing and illustrating their line shafting equipment for industrial plants.

Steinmetz Electric Truck.—A booklet issued by the Steinmetz Electric Motor Car Corporation, Baltimore, Md., describing and illustrating the Steinmetz Electric Truck.

Daylight—The Natural Illuminant.—A small book issued by the Skybryte Company, Bangor Building, Cleveland, Ohio. The purpose of this book is to show what daylight is and to point out some of its advantages. The subject is extensive and complex, but some of the chief features are discussed as briefly and simply as possible.

The Things That Are Caesar's.—A booklet, 4th edition, issued by A. L. Fowle, 61 Broadway, N. Y., concerning the progress of the world and the uplift of labor by capital and its earnings and accumulations.

Treated Ties and Timbers for Industrial Plants.—Bulletin No. 24, issued by Century Wood Preserving Company, Century Building, Pittsburgh, Pa., covering treated ties and timbers for industrial plants, wood preservation, processes used in timber treatment, etc.

'Lectromelt Calculator.—Distributed by the Pittsburgh Electric Furnace Corporation, Pittsburgh, Pa., is a very useful form of circular slide rule for calculating the additions of various alloys and various metal mixtures, to allow any given percentage of alloy, and allow any ordinary percentage of loss in the absorption of an alloy. This device is intended for the aid of the furnace superintendent and melter in the foundry and metallurgical industry generally and on account of the rapidity and accuracy with which the calculations are made, will serve a very useful purpose throughout the steel and metal field.

New Era Dawns for Electric Trucks.—A folder issued by Steinmetz Electric Motor Car Corporation, Baltimore, Md., containing the statements of experienced users of electric

trucks. They are frank, unprejudiced expressions, of significant interest, based upon accurately kept records of service and costs.

Crain's Market Data Book and Directory of Class, Trade and Technical Publications.—Second edition, published by C. D. Crain, Jr., 537 S. Dearborn street, Chicago, Ill. The basic idea of the book remains the presentation of the statistical and marketing data regarding each industry, trade and profession, for the purpose of enabling the advertiser or merchandiser to obtain a picture of the field as a whole. The marketing information is followed by a complete list of publications covering the classification.

Rapid Moore 'Lectromelt Furnaces.—A folder issued by Pittsburgh Electric Furnace Corporation, Pittsburgh, Pa., describing the advantages of Rapid Moore 'Lectromelt Furnaces.

The Merchants' Association of New York Year Book, 1922.—A résumé of the activities of The Merchants' Association of New York for its twenty-fifth fiscal year beginning May 1, 1921, and ending April 30, 1922, is submitted in this report. In compiling this résumé it is practicable specifically to mention only the more important matters, because a detailed statement of all the diverse and continuing services performed by the Association during the period cannot be included within the proper limits of an annual report. A more comprehensive view of the work of the Association during that year may be had by a careful examination of the detailed reports of the Bureau Managers. The book includes reports of various bureaus, purposes of the association, list of members, plan of organization and by-law of the association.

Banka Tin.—A beautiful little volume, profusely illustrated with pictures and charts, published by the Dutch East Indian Government, giving statistics of tin production in Banka, historical data, uses and methods of production. The book will be most interesting to everyone concerned in the manufacture and sale of tin.

Radio.—The latest catalogue of practical and radio books, issued by the Norman W. Henley Publishing Company, New York. It includes the publications of that company on the industrial arts and radio.

Elements of Industrial Heating.—A booklet issued by W. S. Rockwell Company, New York. It is stated that the booklet represents an effort to encourage a broader view of the principles governing the heat-treatment of metallurgical, chemical and ceramic products, and the selection and use of equipment, fuel or electricity as a means to that end. The matter is entirely technical and relates to principles and their application in practice, and before publication was reviewed by teachers and engineers of note to ensure its accuracy and freedom from bias.

Metal Market Review

Written for The Metal Industry by METAL MAN

COPPER

New inquiries for copper recently were on a moderate scale both for domestic consumption and export. The available supply however, is becoming larger, as output continues to increase, especially at the South American properties. Developments at the Chile mines are of increasing importance and of such magnitude that the market has turned heavy lately with ready sellers of electrolytic at 13¾ cents per pound for delivery during the last two months of the year.

The statistical position of copper has improved greatly since the beginning of the year, but there are indications that the refined production has reached a stage where the increased tonnage of output will eventuate in creating a new oversupply. With this prospect in view there has developed a greater degree of caution among consumers. The consuming trade do not apprehend any scarcity of copper, and although consumption continues in large volume manufacturers believe supplies will remain on such a generous scale there is reason to conclude that copper will be plenty and cheap for several months.

ZINC

There is a firm tone to the zinc market, but buying is for nearby requirements and in moderate quantities. Prices, however, hold up well at 7.45c New York and 7.10c East St Louis. The large demands of recent weeks has improved the condition of the zinc market materially. Reliable reports indicate that current consumption has expanded greatly during the last six months. Stocks in this country and Europe have shrunk below normal, while production is claimed to be less than consumption. Shipments are maintained in large volume, while mine output is well below the monthly movements into trade channels. Surplus stocks are less than half what they were last May. The statistical situation is strong both in this country and at foreign sources of supply. Stocks are specially low in England and on the continent.

TIN

Heavy speculative operations and sharp price advances were recent features of the London market. The frantic bidding up of prices by prominent English dealers threw the local market into a state of decided unsettlement and uncertainty. Consumers were specially conservative in view of the hazardous situation created by feverish speculative manipulation. Straits tin in London on October 31 quoted £185 7s 6d per ton, or £21 5s per ton higher than the closing price on September 29.

The activity of the London market during the past month was a persistent feature, with sales of over 21,500 tons. On November 1 the market in London had a break of £3 15s on the spot position on rumors that the leading figure in the bull group was selling. A further slight decline in the Straits price was recorded on November 2. While the situation has become tense, with a sharp reaction from the high peak, there is a possibility that the "bulls" may come back to the attack in the attempt to gain the goal of £200 per ton before the gradual unloading for profits begins.

LEAD

The lead market holds its firmness on the New York basis of 6.80c@6.90c and 6.45@6.50c for East St. Louis delivery as per quotations in the outside market. The American Smelting and Refining Company quotations are 6.50c New York, and 6.30c at East St. Louis. A large consumption and steady demand are the chief influences for the strong tone of the market. Holders regard the situation as definitely in their favor, and higher selling levels are suggested as possible in the near future.

Another advance by the American Smelting & Refining Company of one-quarter cent per pound went into effect on November 2, raising the New York quotation to 6.75c, and East St. Louis delivery to 6.55c. The outside range remains above these figures, and with a scarcity of spot lead at eastern points the market holds strong. Immediate needs of consumers, however, are pretty well covered, but there are always new requirements of more or less importance coming to the surface. Market on November 3 has developed further strength and quotes 7c New York. Prompt supplies scarce. Present market is highest in last 20 months.

ALUMINUM

There are no open prices by the Aluminum Company. Quotations are given on specifications, and this policy has been followed for several weeks. The outside market is quoting 20½c@21c for 99% plus virgin metal, and 20c@20½c for 98-99% material. There is only routine trade to note, and the market has settled down on a humdrum basis.

Total value of aluminum products in United States for the year 1921 is now officially stated at $45,822,000. These figures compare with $75,278,000 for 1919, and show a decrease of 39.1%. Returns indicate that combined output of all plants in 1921 was approximately 50% of the maximum capacity, based upon a demand requiring full running time.

ANTIMONY

There is not much interest displayed in the market for antimony at present. The tone is easier and demand dull,

with Chinese regulus on basis of 6⅝c@6¾c duty paid. The market is very quiet and does not reflect any special requirements. There were recent indications that China was in a more receptive mood to meet inquiries for prompt and future shipments.

QUICKSILVER

Market movements in quicksilver are only moderately active. Small lots quote $72 to $72.50 per flask, but orders for 100-flask quantities would probably be taken at $70 to $71 per flask. Stocks on hand are in more liberal supply and buyers are therefore inclined to be conservative in making fresh purchases. Manufacturers are understood to have fair supplies to draw on between now and end of the year. New inquiries are expected to develop within the next few weeks. Moderate imports are noted since the new tariff went into effect.

PLATINUM

Demand for platinum has been light lately and prices are lower than a month ago. The official quotation is now $108 per ounce, but recent orders were accepted at as low as $104 for virgin metal and at $100 an ounce for remelted stock. Supplies are reported low in Russia, but there is said to be an accumulation of stocks in other quarters in expectation of securing higher prices.

SILVER

Silver prices show greater variation lately in all the markets of the world. Current prices of 67¼c for foreign production and 34d in London compare with 74¼c New York and 37⅛d London in last May. The weakness in silver is attributed to recent selling by China due in part to fact that the Canton mint has ceased purchasing silver for subsidiary coinage purposes. Speculators have also been operating in China. Silver stocks at Shanghai were recently reported at $86,000,000 (Mex.) against $77,000,000 in September and $53,000,000 in October last year. The average price of silver for the first 10 months of this year has been around 68 cents against 62 cents last year. Total Government purchases under the Pittman Act approximate 140,000,000 ounces. As we go to press quotations on bar silver are lower at 66⅞c for foreign product. London also lower at 33 13/16 pence per ounce on November 3.

OLD METALS

During the last 30 days old metals have changed hands in good volume. Activity has been the special feature in this market for several weeks past, but there is some let-up in demand recently. Dealers have fair supplies on hand, and present buying is on a more critical basis than was the case a short time ago. Copper scraps are not particularly buoyant at present, and reflect the easy tone of the electrolytic market. Scrap aluminum moves readily being scarce and in good demand. There was a good foundry outlet for heavy brass, but dealers were more inclined to shave copper prices when actual business developed. The lead scraps are able to maintain a firm tone. Current quotations are for crucible copper wire of first quality, 11⅜c@12⅞c; light copper, 9½c@9⅞c; heavy brass, 6½c@6¾c; heavy lead, 5½c@5⅞c; new zinc scrap, 4⅝c@5¼c; old cast aluminum, 13¼c@13½c; new brass clippings, 8¼c@8¾c, and composition scrap, 8½c@9c.

WATERBURY AVERAGE

Lake Copper—Average for 1920, 13.136. January, 1922, 13.875—February, 13.375—March, 13.125—April, 13.00—May, 13.375—June, 14.00—July, 14.125—August, 14.125—September, 14.25—October, 14.25.

Brass Mill Zinc—Average for 1920, 5.175—January, 1922, 5.25—February, 5.00—March, 5.10—April, 5.40—May, 5.55—June, 5.85—July, 6.20—August, 6.50—September, 7.10—October, 7.65.

Daily Metal Prices for the Month of October and November 3, 1922

Date	2	3	4	5	6	9	10	11	12	13	16	17	18
Copper (f. o. b., Ref.)c/lb. Duty Free:									Holiday				
Lake (Delivered)	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	.....	14.25	14.25	14.25	14.25
Electrolytic	14.00	14.00	14.00	14.00	14.00	14.00	14.00	13.875	.....	13.75	13.75	13.75	13.75
Casting	13.40	13.40	13.40	13.40	13.40	13.40	13.40	13.40	.....	13.40	13.40	13.40	13.375
Zinc (f.o.b. St. L.)c/lb. Duty 1¼ c/lb.:													
Prime Western	6.85	6.80	6.75	6.70	6.65	6.65	6.65	6.65	.....	6.75	6.85	6.85	6.80
Brass Special	6.95	6.90	6.85	6.85	6.80	6.80	6.75	6.75	.....	6.85	6.95	6.95	6.90
Tin (f. o. b. N. Y.) c/lb. Duty Free:													
Straits	33.00	33.00	32.75	32.85	32.90	33.25	33.50	33.75	.....	34.20	35.00	34.50	34.50
Pig—99%	32.75	32.625	32.375	32.50	32.60	32.75	33.00	33.25	.....	33.75	34.125	33.75	33.75
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	.....	6.35	6.35	6.35	6.30
Aluminum, c/lb. Duty 5c/lb.	19.00 20.10	19.00 20.10	21.00	21.00	21.00	21.00	21.00	21.00	.....	21.00	21.00	21.00	21.00 .....
Nickel c/lb. Duty 3c/lb.													
Ingot—Internat. Nick. Co.	36	36	36	36	36	36	36	36	.....	36	36	36	36
Outside Spot	32-34	32-34	32-34	32-34	32-34	32-34	32-34	32-34	.....	32-34	32-34	32-34	32-34
Electrolytic (Internat. Nick. Co.)—													
Ni—99.80 contam. impurities—.14.	39	39	39	39	39	39	39	39	.....	39	39	39	39
Brit.-American Nick. Corp.—													
Ni—98.50, contam. impurities—.80.	33	33	33	33	33	33	33	33	.....	33	33	33	33
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	6.875	7.00	6.875	6.875	6.875	6.875	7.00	7.00	.....	7.00	7.00	7.00	7.00
Silver (foreign) c/oz. Duty Free	69.25	69.375	69.375	69.375	69.125	69.125	69.125	69.00	.....	67.625	68.125	66.75	67.25
Platinum $/oz. Duty Free	118	118	118	112	112	112	112	112	.....	112	108	110	112

Date	19	20	23	24	25	26	27	30	31	High	Low	Aver.	Nov. 3
Copper (f. o. b., Ref.)c/lb. Duty Free:													
Lake (Delivered)	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.125
Electrolytic	13.75	13.75	13.75	13.75	13.75	13.75	13.75	13.75	13.75	14.00	13.75	13.839	13.625
Casting	13.375	13.375	13.375	13.375	13.375	13.375	13.40	13.40	13.40	13.40	13.375	13.392	13.40
Zinc (f.o.b. St. L.)c/lb. Duty 1¼ c/lb.:													
Prime Western	6.85	6.85	7.00	7.05	7.05	7.10	7.10	7.10	7.10	7.10	6.65	6.864	7.075
Brass Special	6.95	6.95	7.10	7.15	7.15	7.20	7.20	7.20	7.20	7.20	6.75	6.971	7.20
Tin (f. o. b. N. Y.) c/lb. Duty Free:													
Straits	35.125	35.00	25.25	35.50	36.00	36.00	36.75	37.50	37.125	37.50	32.75	34.640	37.25
Pig—99%	34.25	34.125	34.375	34.625	35.25	35.25	36.00	36.75	36.375	36.75	32.375	34.011	36.50
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.30	6.30	6.40	6.40	6.45	6.45	6.45	6.50	6.50	6.50	6.30	6.376	6.85
Aluminum, c/lb. Duty 5c/lb.	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	19.00 20.10	20.809	21.00 .....
Nickel c/lb. Duty 3c/lb													
Ingot—Internat. Nick. Co.	36	36	36	36	36	36	36	36	36	36	36	36	36
Outside Spot	32-34	32-34	32-34	32-34	32-34	32-34	32-34	32-34	32-34	32-34	32-34	32-34	32-34
Electrolytic (Internat. Nick. Co.)—													
Ni—99.80 contam. impurities—.14.	39	39	39	39	39	39	39	39	39	39	39	39	39
Brit.-American Nick. Corp.—													
Ni—98.50, contam. impurities—.80.	33	33	33	33	33	33	33	33	33	33	33	33	33
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	7.00	6.75	6.75	6.75	6.75	6.75	6.70	6.70	6.70	7.00	6.70	6.820	6.60
Silver (foreign) c/oz. Duty Free	67.50	66.75	67.625	67.875	67.75	67.125	67.25	67.25	67.00	69.375	66.75	68.077	66.875
Platinum $/oz. Duty Free	108	108	108	108	108	108	108	108	108	118	108	110.80	108

Metal Prices, November 3, 1922

INGOT METALS AND ALOYS

Brass Ingot, Yellow	"	"	"	10 to12¼
Brass Ingots, Red	"	"	"	12¼to14
Bronze Ingot	"	"	"	13 to15¼
Bismuth				$2.65-2.75
Cadmium				1.15-1.25
Casting Aluminum Alloys	"	"	"	18 to21
Chromium Metal—95-98% Cr., per lb. Cr. contained				1.50
Cobalt—97% pure				3.00-3.25
Manganese Bronze Castings	"	"	"	21 to33
Manganese Bronze Ingots	"	"	"	12 to15½
Manganese Bronze Forgings	"	"	"	30 to40
Manganese Copper, 30%	"	"	"	28 to45
Manganese Metal—95-98% Mn., carbon free, per lb.				0.75
Magnesium Metal				$1.25-1.35
Monel Metal	"	"	"	38
Parsons Manganese Bronze Ingots	"	"	"	17½to19
Phosphor Bronze	"	"	"	24 to30
Phosphor Copper, guaranteed 15%	"	"	"	17 to23
Phosphor Copper, guaranteed 10%	"	"	"	16½to22
Phosphor Tin, guarantee 5%	"	"	"	43 to57
Phosphor Tin, no guarantee	"	"	"	41 to55
Quicksilver				$72.00-72.50
Silicon Copper, 10%	according to quantity			28 to35

OLD METALS

Buying Prices		Selling Prices
11¼to11¾	Heavy Cut Copper	12½to12¾
11 to11½	Copper Wire	12¼to12½
10 to10¼	Light Copper	11 to11¼
8½to 9	Heavy Machine Comp.	10 to10½
6¾to 7	Heavy Brass	8 to 8½
5½to 6	Light Brass	7 to 7¼
6¼to 6½	No. 1 Yellow Brass Turnings	7¼to 7½
7¾to 8½	No. 1 Comp. Turnings	9¼to10
4½to 4¾	Heavy Lead	5 to 5¼
4½	Zinc Scrap	4¾to 5
7 to 7½	Scrap Aluminum, Turnings	9 to10
12 to13	Scrap Aluminum, cast alloyed	14½to15½
15 to16	Scrap Aluminum, sheet (new)	17½to18½
18½	No. 1 Pewter	22½
15	Old Nickel anodes	17
23 to25	Old Nickel	27 to29

BRASS MATERIAL—MILL SHIPMENTS

In effect September 27, 1922
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.18½	$0.20	$0.21½
Wire	0.19	0.20½	0.22
Rod	0.17	0.21	0.22½
Brazed tubing	0.25¾	.....	0.30¼
Open seam tubing	0.25¾	.....	0.30¼
Angles and channels	0.28⅜	.....	0.33¼

To customers who buy less than 5,000 lbs. in one order

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19½	$0.21	$0.22½
Wire	0.20	0.21½	0.23
Rod	0.18	0.22	0.23½
Brazed tubing	0.26⅜	.....	0.31¼
Open seam tubing	0.26¾	.....	0.34¼
Angles and channels	0.29⅜	.....	0.34¼

SEAMLESS TUBING

Brass, 23c. to 24c. per lb. base.
Copper, 24¾c. to 25¾c. per lb. base.

TOBIN BRONZE AND MUNTZ METAL

Tobin, Bronze Rod		20½c. net base
Muntz or Yellow Metal Sheathing (14"x48")	18½c.	" "
Muntz or Yellow Rectangular Sheets other than Sheathing		19½c. net base
Muntz or Yellow Metal Rod	16½c	" "

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	21½c.-22½c. net base
From stock	22½c.-23½c. net base

BARE COPPER WIRE—CARLOAD LOTS

16c. to 16¼c. per lb. base.

SOLDERING COPPERS

300 lbs. and over in one order	19¾c. per lb. base
100 lbs. to 200 lbs. in one order	20¼c. per lb. base

ZINC SHEET

Duty, sheet, 15%. Cents per lb.

Carload lots, standard sizes and gauges, at mill, 9c. to 9¼c. basis less 8 per cent. discount.

Casks, jobbers' prices	9¾c. to 10½c.
Open casks, jobbers' prices	10½c. to 11½c.

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga. and heavier, base price	34c.
Aluminum coils, 24 ga. and heavier, base price	31c.
Foreign	42c.

NICKEL SILVER (NICKELENE)

Base Prices

Grade "A" Nickel Silver Sheet Metal

10% Quality		26¾c. per lb.
15%	"	28½c. " "
18%	"	29¼c. " "

Nickel Silver Wire and Rod

10%	"	29¾c. " "
15%	"	33¾c. " "
18%	"	36½c. " "

MONEL METAL

Shot	32
Blocks	32
Sheet Bars	40
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	50
Hot Rolled Sheets (base)	45

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 35 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs., 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 70½c. to 73c. per Troy ounce, depending upon quantity.

Rolled sterling silver 67½c. to 70c.

NICKEL ANODES

85 to 87% purity	42½c. per lb.
90 to 92% purity	45c. per lb.
95 to 97% purity	47½c. per lb.

Supply Prices, November 3, 1922

CHEMICALS

In Commercial Quantities—New York Prices

Acetone	lb.	.20–.22½
Acid—		
Boric (Boracic) Crystals	lb.	.13
Hydrochloric (Muriatic) Tech., 20 deg., Carboys	lb.	.02½
Hydrochloric, C. P., 20 deg., Carboys	lb.	.08
Hydrofluoric, 30%, bbls.	lb.	.07
Nitric, 36 deg. Carboys	lb.	.07
Nitric, 42 deg. Carboys	lb.	.07¼
Sulphuric, 66 deg. Carboys	lb.	.02½
Alcohol—		
Butyl	lb	.18-23
Denatured in bbls.	gal.	.36
Alum—		
Lump, Barrels	lb.	.04½
Powdered, Barrels	lb.	.05
Aluminum sulphate, commercial tech	lb.	.02½–.03
Aluminum chloride solution	lb.	.20
Ammonium—		
Sulphate, tech., Barrels	lb.	.04
Sulphocyanide	lb.	.50
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, Kegs	lb.	.10
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), Barrels	lb.	.06
Calcium Carbonate (Precipitated Chalk)	lb.	.05
Carbon Bisulphide, Drums	lb.	.09
Chrome Green	lb.	.36
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.36
Carbonate, Barrels	lb.	.20
Cyanide	lb,	.52
Sulphate, Barrels	lb.	.06½
Copperas (Iron Sulphate, bbl.)	lb.	.02½
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	3.00
Gold Chloride	oz.	14.00
Gum—		
Sandarac	lb.	.28
Shellac	lb.	—
Iron, Sulphate, see Copperas, bbl	lb.	.02½
Lead Acetate (Sugar of Lead)	lb.	.12-.13
Yellow Oxide (Litharge)	lb.	.09
Mercury Bichloride (Corrosive Sublimate)	lb.	1.05
Nickel—		
Carbonate Dry	lb.	.40
Chloride, 100 lb. lots	lb.	.27½–.40
Salts, single, bbls.	lb.	.12
Salts, double, bbl.	lb.	.11
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity		.25-.30
Potash, Caustic, Electrolytic 88-92% fused, drums	lb.	.06½
Potassium Bichromate, casks	lb.	.10½
Carbonate, 80-85%, casks	lb.	.05
Cyanide, 165 lb. cases, 94-96%	lb.	.60
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Official	oz.	—
Rosin, bbls.	lb.	.03½
Rouge, nickel, 100 lb. lots	lb.	.20
Silver and Gold	lb.	.60
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide	oz.	—
Nitrate, 100 ounce lots	oz.	.47
Soda Ash, 58%, bbls.	lb.	.03
Sodium—		
Biborate, see Borax (Powdered), bbls.	lb.	.05½
Bisulphate, tech., bbls.	lb.	.03½
Cyanide, 96 to 98%, 100 lbs.	lb.	.25
Hydrate (Caustic Soda) bbls.	lb.	.04½
Hyposulphite, kegs	lb.	.04
Nitrate, tech. bbls.	lb.	.04
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass) bbls.	lb.	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.12–.13
Sulphur (Brimstone) bbls.	lb.	.01¾
Tin Chloride, 100 lb. kegs	lb.	.30
Tripoli	lb.	.03
Verdigris, see Copper Acetate	lb.	.36
Water Glass, see Sodium Silicate, bbls.	lb.	.02½
Wax—		
Bees, white ref. bleached	lb.	.55
Yellow, No. 1	lb.	.30
Whiting, Bolted	lb.	.02½-.06
Zinc, Carbonate, bbls.	lb.	.13-.17
Chloride, 600 lb. lots	lb.	.06½
Cyanide	lb.	.40
Sulphate, bbls.	lb.	.03½

COTTON BUFFS

Open buffs, per 100 sections (nominal).

12 inch, 20 ply, 64/68, cloth	base,	39.45
14 inch, 20 ply, 64/68, cloth	base,	49.05
12 inch, 20 ply, 84/92, cloth	base,	45.00
14 inch, 20 ply, 84/92, cloth	base,	60.60
12 inch, 20 ply, 88/96, cloth	base,	52.30
14 inch, 20 ply, 88/96, cloth	base,	70.45
Sewed Buffs, per lb., bleached and unbleached	base,	.50

FELT WHEELS

			Price Per Lb. Less Than 100 Lbs.	300 Lbs. and Over
Diameter—10" to 16"	1" to 3"		2.60	2.35
" 6" 8" and over 16"	1" to 3"		2.70	2.45
" 6" to 24"	Over 3"		3.00	2.75
" 6" to 24"	½" to 1"		3.60	3.35
" 4" to 6"	¼" to 3"		4.60	Any quantity
" Under 4"	¼" to 3"		5.20	Any quantity

Grey Mexican or French Grey—10c. less per lb. than Spanish, above. Odd sizes, 50c. advance.